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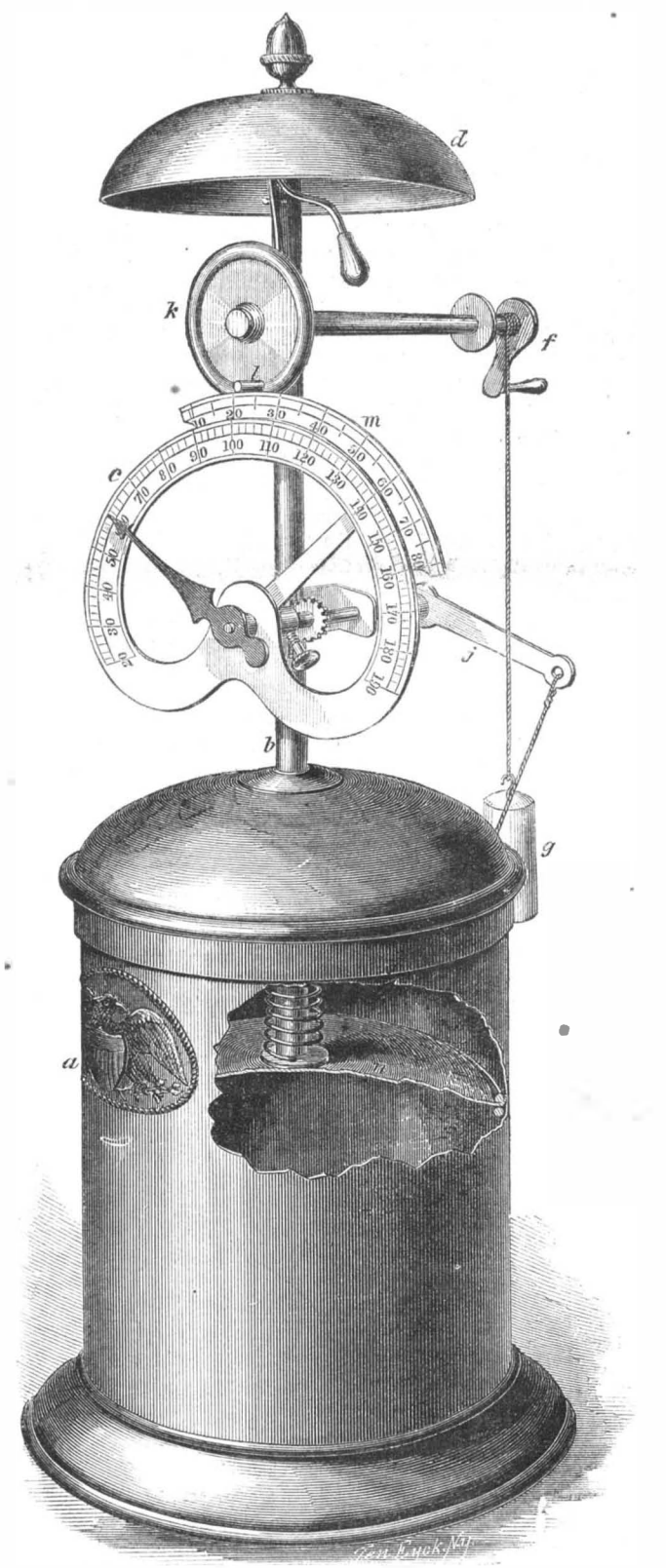
IMPROVED DETECTOR AND ALARUM.

All proprietors of breweries, distilleries, printworks, bleachworks, paper mills, dyeing works or other manufactories, and all persons who desire to keep rooms, vats or vessels at a uniform temperature, are provided by this invention with a cheap and simple apparatus for accomplishing the object. It is also a reliable alarum for giving notice of a great increase of heat, either from fire or any other cause.

A copper cylinder, *a*, has a tube, *b*, rigidly secured to its top, and an elastic diaphragm, *h*, stretched across its interior and attached air-tight to its sides. A rod, *i*, is fastened to the diaphragm and rises up through the interior of the tube. As the air below the phragm is warmed it expands and presses the diaphragm upward, thus raising the rod, the upper portion of the cylinder communicating with the external air, and the lower portion being air-tight. To indicate the movements of the rod, a slot is made in the enclosing tube, and a small pinion is secured to mesh into a rack on this portion of the rod. On the end of the pinion's axle is placed an index which traverses in front of a graduated arc; the arc being rigidly fastened to the tube, *b*. For regulating the temperature of a room or other enclosure, an arm, *j*, is secured to the axle of the pinion and connected with the register or valve, by which the flow of the air either into or out of the room is controlled. The alarm is operated by a weight, *g*, which turns the wheel, *k*, this wheel having a pin upon its further side which strikes a rod in its revolutions and rings the bell, *d*. By a simple device the wheel is prevented from revolving until a certain temperature is reached, when it is released. The pin, *l*, rests upon the arm, *m*, which thus holds the pin a little removed from a position directly below the center of the wheel, and when the arc is carried along till its end passes from beneath the pin, the wheel is permitted to revolve and the bell is rung. The arc, *m*, is secured by an arm to the axle of the pinion by means of a set screw, so that it may be adjusted to ring the alarum at any temperature desired.

This neat and valuable invention has been patented in England, and is in practical use on the steamship *Great Eastern*. The American patent was procured, through the Scientific American Patent Agency, Feb. 22, 1860, and further information in relation to it may be obtained by addressing the inventor, W. D. Grimshaw, at No. 9 Fair-street, Newark, N. J.



GRIMSHAW'S DETECTOR AND ALARUM.

AMERICAN MACHINERY FOR ENGLAND.—Messrs. Todd & Rafferty of Paterson, N. J., have recently secured, through our agency, a patent in Great Britain for some valuable improvements in machinery for preparing and spinning hemp, for making cordage. Mr. Todd sails for England on Saturday next, for the purpose of putting up some of this machinery in London, which was ordered by a company there some time ago. Our pride is *tickled* whenever American mechanics receive orders for machinery from England, and this, because English machinists are second in skill to none in the world.

CAUSE OF DETERIORATION OF THE SOIL.

The Baltimore *Rural Register* says:—"In this new country, upon which the first European settlements were made but a little more than two centuries ago, go where we will, east of the Alleghany mountains, we are constantly meeting with old fields, worn into gullies, or covered with sedge, and perfectly valueless in their present condition for agricultural purposes. In England, on the contrary, during the last half-century, the crops instead of diminishing in quantity, have been increased in the product to the acre by more than 50 per cent. Yet the land there has been under cultivation more than a thousand years. Now it has been repeatedly demonstrated that by pursuing a similar system, our soils are capable of raising as large an amount of grain or hay to the acre as those of any other country. The remarkable decrease in our agricultural products which statistical tables indicate, can proceed from no other cause than careless and slovenly farming. The fatal defect in the old system of farming with us was, that it did not take into due consideration the injurious influence excited by our climate upon surfaces constantly exposed to an almost tropical heat in the summer season. At an earlier day tobacco was our staple production. It was what wheat has since become—the planter's money crop; and high prices and a steady demand stimulated him to cultivate in a negligent manner as many acres of this plant as the number of his field hands would admit of putting under the plow. A succession of crops taken from the same field, without rest or intermission, speedily wore the life out of it. Fresh lands were cleared, which were subjected to the same ruinous mode of treatment, until in the course of a few years, thousands of acres of as fertile soil as the world could boast became but little better than a sterile waste. Where the fields were not sufficiently exhausted to be thrown entirely out of cultivation, corn succeeded tobacco; and shallow plowing, and the sun, the wind, the rain, and the frost acting continually upon the exposed surface, completed the work of destruction which reckless tillage had commenced. If there had been instituted, from the beginning, a proper rotation of crops; if tap-rooted plants had been allowed to succeed fibrous-rooted plants; if the manure of the barn-yard, and the wood ashes of the house fires, had been husbanded; if shells, or lime, or marl had replaced the alkaline constituents which had been taken from the soil by previous crops; if plaster had been permitted to exert its singular influence upon the growing clover, and if the latter instead of being cut and carted off the land, had been turned under it, those fields now looking so barren and forlorn would have been more fertile at this day than they were when the plow turned the first furrow in the virgin soil."

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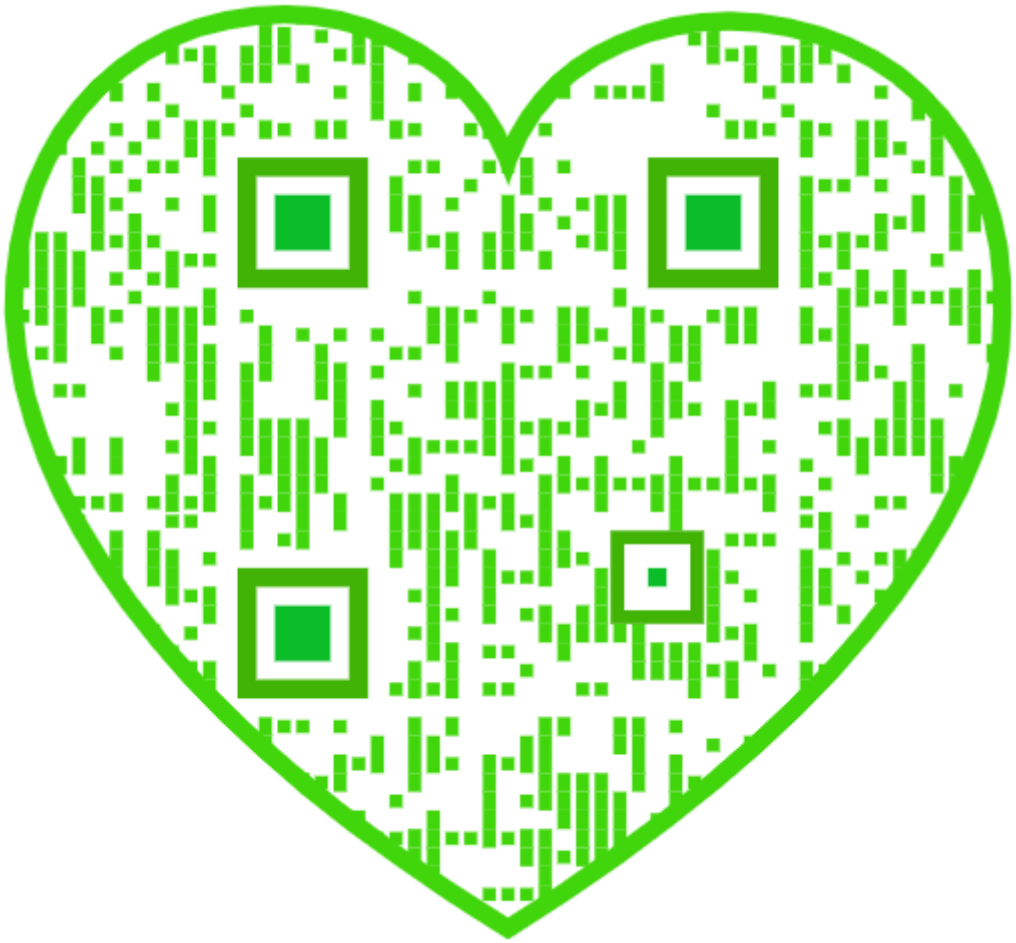

NAVAL ARCHITECTURE OF GREAT BRITAIN.

ECONOMY OF FUEL IN STEAMSHIPS—THE WAVE-LINE THEORY.

In our last number, we presented the substance of William Fairbairn's paper on the subject of iron ships, read before the congress of naval architects in London. The following are abstracts of two other papers read on that occasion:—

Robert Murray read an essay on the various means and appliances for economizing fuel in steamships. He commenced by remarking that the naval architect and marine engineer were now intimately connected in the endeavor to produce the grandest effort of modern science—a perfect steamship. His subject naturally divided itself into two heads, namely, how to raise steam most economically in the boilers, and how to use it most economically in the engines. In considering these questions, Mr. Murray first showed the importance of having boilers large enough to insure a constant command of steam without the necessity arising for "forcing" the fires, which caused loss in many ways, as was explained in detail. The importance of good stoking was next strongly insisted upon, as the stoker might be wasting coals by the tun at the furnaces while the engineer was puzzling his brain to save a few pounds weight in the engine-room. Mr. Murray recommended the employment of slides or rails for reducing the labor of the stoker in passing the coals from the bunkers to the front of the fires, and urged that ventilating fire-doors and smoke-box doors should be more generally used for keeping the stock-place cool. Large hatches, windsails, and air-tubes should also be employed, not only to promote the health and comfort of the stokers, but also to aid the steaming power of the boilers. He thought that the invention of an effective method of surface condensation was still an unsolved problem in marine engineering. Were such a method devised, not only would there be an actual saving of at least 15 per cent of fuel from the use of fresh water, but the boilers would last longer, and much valuable time which is now consumed in cleaning would be saved. The process of scaling a boiler, as usually practiced, is a very tedious and troublesome one, and is seldom so effectual as could be wished. In some recent experiments at Portsmouth, a boiler was filled with hot air, at a temperature of 400°, which acted most successfully in detaching the scale from the plates and tubes, in consequence of the rapid expansion induced in the metallic surfaces. The plan of heating the feed water, by means of either the brine which is blown off or the heat at the foot of the chimney, was next mentioned with approval; and then the advantages of superheating the steam were described, these advantages being the evaporation and neutralization of the fine spray which is usually carried up with the steam, and the prevention of condensation in the cylinder. The plan of superheating adopted by the Peninsular and Oriental Company was stated to be very successful. A great many reliable experiments had been made at Southampton in the vessels of the Royal Mail Company, the Peninsular and Oriental Company, the Cape Mail Company, and others, to test the actual economy of the superheating process by comparison with the previous consumption of coal before the superheating apparatus was fitted; and in every instance that had come under the author's observations there had been a perceptible improvement, sometimes taking the shape of increased speed in engine and vessel, sometimes a marked saving of fuel was effected, while both the results were combined in other cases.

Mr. Murray then pointed out the advantages of expansion, and how the piston, under diminished pressure, came gently to the end of its stroke at top and bottom of the cylinder. Steam jackets had also proved very beneficial, and there had been a great saving of fuel experienced in the high expansion carried on in the marine engines built by Messrs. Randolph & Elder, of Glasgow, for the Pacific Mail Company. In these steamships, each engine has two cylinders, into the large one of which the steam is worked entirely by expansion, and no doubt about one-half the fuel formerly consumed was now saved; still there were many instances of single cylinder engines in which the same beneficial results were secured. He believed that the day was not far distant when the average consumption of fuel by marine engines would be reduced one half.

J. Scott Russell, who has been called the author of the wave-line theory of shipbuilding," was called upon to read an explanation of his theory. He stated that he had made a very great number of experiments for the purpose of discovering, if possible, the best form of vessels—that of least resistance—and the kind of resistance which vessels met with in moving through the water. The first inquiry that he had proposed to himself was, what becomes of all the water which a ship removes out of her way? and how does it get out of the way? In prosecuting these inquiries, he first employed a small trough or canal, one foot wide and one foot deep, and of a considerable length. He raised a small heap of water above the natural level of that in the trough by means of a partition at one end, then he withdrew this partition to see what would be the effect. He found that the raised water assumed a beautiful wave form, and ran along the whole length of the canal, and left the surface of the water over which it passed as smooth as it was before. Had the end of the trough been just level with the surface of the still water, the wave would have leapt over it, and left the whole water in the canal undisturbed. This phenomenon is now known as "the solitary wave of translation," and it will travel to an almost incredible distance. He had followed such a wave on horseback, and by other means for miles, but it leaves a little of itself along the whole surface over which it passes.

The next fact ascertained was that whenever the bow of a ship is moved through the water a wave of this kind is produced which is "the traveling or carrier wave," and this gets rid of all the water in the channel which the vessel excavates while moving through it. This wave spreads itself in a thin film along the surface of the water ahead of the vessel (not behind it, nor on each side) with a far greater velocity than that of the vessel itself. After having made experiments on a small scale, Mr. Russell then proceeded with others on a large scale, and made vessels that required to be dragged by horses in a canal. He made positive observations and took measurements; and he found that this was what became of the water displaced by the bow of a boat. On one occasion he drew a large number of boats in one direction on a canal, and the "traveling wave" carried a great part of the water from one end of the canal to the other; in the evening the water was found raised 18 inches at one end, and depressed to the same extent at the other. The velocity with which the "traveling wave" moved was found to depend entirely on the depth of water. At three feet deep, the wave travels at the rate of 6 miles per hour; at five feet, 8 miles; at seven, 10 miles; at ten, 12 miles; at fifteen, 15 miles; at twenty, 18 miles; at thirty, 20 miles; at forty, 25 miles; and at fifty, 30 miles.

In addition to a constant velocity, the wave has a constant shape, and it corresponds with the long hollow wedge-shaped bow, which he exhibited in a diagram. In the "traveling wave," the particles of water composing it were continually being replaced by others, while the wave itself advanced without apparent change. It was the form of wave which led Mr. Russell to adopt that bow for ships, called the "wave form," because it was conformable to the wave of motion in water.

Like many others, he at first thought the stern of a vessel ought to be of the same form as the bow, but a series of experiments satisfied him that the "following wave" (that which runs after a ship to fill up the hollow) always moved with the velocity of the ship; it had not an independent velocity of its own, and did not depend on the depth of water. The "following wave" also repeated itself on an endless series astern of the vessel. The stern of a ship, however, should be formed of cycloidal curves.

But what became of the water at the bow supposing the boat to be dragged with a greater velocity than the "traveling wave"—that is, faster than the water can spread itself? With a force sufficient to compel a boat to go faster than the wave, the water would rise up and stand on both sides of the boat until the load had passed, then fall down into the hollow channel left behind. In a shallow canal in Scotland, where the "carrier wave" only traveled at the rate of seven miles per hour, he had compelled a boat to move at the rate of ten miles, and he found that the water not only rose up, but lifted the boat with it, so that it drew less water than before, and it actually went easier at the rate of ten miles than five per hour. Had not railways then dawned upon the world, England would soon have been dotted with long troughs, and people would have traveled on the tops of these waves in an easier and cheaper mode than by any other means then known.

The "wave bow" of a ship does not interfere with the form of its midship section, nor does it tie down a nautical architect to any proportion of depth to breadth; it could be applied to any general form of ship whatever. The wave line, however, prescribes the exact length of a ship for every speed. To go six miles per hour a vessel must be at least 30 feet long; eight miles, 50 feet; ten miles, 70 feet; twelve miles, 100 feet; fifteen miles, 150 feet; eighteen miles, 200 feet; twenty miles, 300 feet; twenty-five miles, 400 feet; and for thirty miles, 500 feet. He had tried to obtain higher velocities than these with shorter vessels, and had got them, but at a fearful waste of power and it would be folly not to lengthen vessels for the purpose of economy. The wave-line theory makes the length of a bow to that of a vessel's run as 3 to 2. The lines of the *Great Eastern* are an exact copy of the wave lines; the length of the bow is 330 feet; length of run 226 feet; there is also 120 feet of parallel body put into her amidships. It is a valuable conclusion for practical shipbuilders that proportionate length and breadth are not necessary for a fast vessel. It is not necessary that a fast vessel should be narrow, thin and long. Mr. Russell had taken vessels 200 feet long, and made them of every variety of breadth; but whenever they were 200 feet long, and had lines for 16 miles per hour, they moved at that velocity with a given power. There is, however, considerable resistance experienced by water adhering to the surface of a vessel; the greater the amount of surface, the greater is the resistance. Mr. Russell did not claim to be the inventor of hollow bows—they had existed as far back as he could trace steam navigation; but he had discovered what he believed to be the principles of nature which related to the subject. He had been surprised that treatises on naval architecture had not told us to make vessels with hollow bows exclusively. In England, steamships built on the wave-line principle were now common, and their number is constantly on the increase.

THE CATTLE DISEASE.

The Boston *Journal* has just published a letter from an individual who has lately arrived at Boston from the Cape of Good Hope, from which we condense the following facts.

The writer believes that the cattle disease now producing so much alarm in Massachusetts, is the same that has lately proved so destructive to horned cattle in South Africa. The disease at the Cape is called the *lung sickness*; it was introduced about seven years ago by the importation of two Dutch bulls, and spread before its destructive character was fully understood. Attempts were made to isolate the infected stock, and to confine the disease to certain limits, but it was all in vain. All transportation and much of the travel is performed by oxen, who scattered the disease everywhere. Various remedies were tried without success, until *inoculation* was adopted, which proved successful, as it did in the small-pox. The writer thus describes the process of inoculation:—"Inoculation is performed as follows:—Kill a diseased beast not too far gone, and take as much of the lung as you require for the number of cattle you intend to operate upon; throw them down one by one, or otherwise make them fast, cut the hair short off about nine inches from the tip of the tail, make an incision through the skin an inch long, insert a bit of the lung the size of a bean, or rather larger, bandage it properly, and in three days the virus ought to take, and within the week the bandage should be taken off, when the wound appears swollen. Many of the cattle lose their tails by inoculation, and some even die when proper attention has not been given, but so far as I have had experience, few cattle have died of this sickness after being inoculated." The disease has been very destructive in South Africa—a part of the world where cattle are more valued than anywhere else. The price of draught oxen has risen from $15 to $50 since the existence of the plague. The writer thinks the disease is contagious and not an epidemic. We leave that point for the doctors to settle.

Our Boston cotemporary further states that, in view of the alarming extension of the cattle disease, and the need of increased appropriations, Governor Banks has decided that it is expedient to convoke an extra session of the Legislature.

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THE PURIFICATION OF WATER.

As the water with which many cities are supplied becomes impure and unfit for drinking during warm weather, unless it is purified by some artificial process, the following are some methods which may be used for this purpose, and will prove very useful.

In India, the natives never drink clear well water, if they can get pond or river water, which is always more or less impure, according to circumstances, and which they treat in a peculiar manner. One of the seeds of *strychnos potatorum* (belonging to the family which furnish the deadly poison, strychnine), is well rubbed for a minute or two around the inside of the vessel containing the water, generally an unglazed earthen one, which is then left to settle; in a very short time the impurities fall to the bottom, leaving the water clear, and so far as we have been able to learn, perfectly wholesome. These seeds are constantly carried about by soldiers in time of war, to enable them to purify the water. The people of India also have a simple method of softening hard water by boiling it. In a report made to the British government in 1851, on the water of London, by Professors Graham, Miller and Hoffman, those eminent chemists stated that, in making experiments with artificially prepared hard water, containing 13½ grains of carbonate of lime per gallon, the raising of it to the boiling point reduced the hardness from 13.5 to 11.2 degrees. Ebullition, continued during five minutes, reduced it to 6.3 degrees, during fifteen minutes, to 4.4 degrees, for thirty minutes, to 2.6 degrees, and for one hour to 2.4 degrees. The first five minutes' boiling had more effect in reducing the hardness of the water than all the rest put together, and yet it is evident that, to produce the full effect, a more prolonged boiling is necessary, as the effect is not instantaneous, but progressive.

Several years ago, Professor Clark, of Aberdeen, Scotland, took out a patent in England for purifying hard water by the addition of a little fresh burned lime (Ca O).

Coarse sand, gravel and charcoal, laid in successive layers, purify and deodorize water that is passed through such a filtering bed; but the materials require to be renewed frequently, as their pores fill up with use, and cease to remove the impurities. Alum has a wonderful capacity for precipitating the mud in water. M. Darcet found that 7½ grains of alum rendered, in the course of one hour, one quart of muddy Nile water perfectly clear and transparent. The action in this case is a strictly chemical one; the salt is decomposed, its alumina is precipitated, and with it an insoluble sulphate of lime.

The most efficient method of purifying water is to filter it through layers of sand, gravel, and magnetic oxyd of iron broken into small pieces. This magnetic oxyd possesses astonishing properties as a water-purifier—a discovery which was made last year by Mr. Spencer (of England), the inventor of electro-metallurgy.

MORIN ON "FRICTION."

The following summary, by Arthur Morin, of the general results of his numerous and careful experiments on the friction of journals, we extract from his work, *Morin's Mechanics*, recently translated by Joseph Bennett and published by D. Appleton & Co., of this city.

Besides the experiments previously reported upon the friction of plane surfaces, I have made a great number upon that of journals, by means of a rotating dynamometer with a plate and style, the first apparatus of the kind, but which it is not worth while to describe here.

The axle of this dynamometric apparatus was hollow and of cast iron. It could receive, by means of holders exactly adjusted, a change of journals of different materials and diameters. Its load was composed of solid cast iron disks, weighing 331 lbs. each, whose number could be increased so as to attain a load of more than 3,042 lbs. A pulley, the friction of whose axle was slight, and which transmitted the motion by the intervention of a spring, received by a belt, the motion of a hydraulic wheel, and the difference of tension of the two parts of the belt was measured by the dynamometer with the style.

We used journals from .11 to .22 feet in diameter. The velocities varied in the ratio of 1 to 4. The pressures reached 4,145 lbs., and within these extended limits we have proved that the friction of journals is subject to the same laws as that of plane surfaces. But it is proper to observe that, from the form itself of the rubbing body, the pressure is exerted upon a less extent of surface, according to the smallness of the diameter of the journal, and that unguents are more easily expelled with small than with large journals.

This circumstance has a great influence upon the intensity of friction, and upon the value of its ratio to the pressure. The motion of rotation tends, of itself, to expel certain unguents, and to bring the surfaces to a simply unctuous state. The old mode of greasing, still used in many cases, consisted simply in turning on the oil, or spreading the lard or tallow upon the surface of the rubbing body, and in renewing the operation several times in a day.

We may thus, with care, prevent the rapid wear of journals and their boxes; but, with an imperfect renewal of the unguent, the friction may attain .07, .08, or even .1 of the pressure.

If, on the other hand, we use contrivances which renew the unguents without cessation, in sufficient quantities, the rubbing surfaces are maintained in a perfect and constant state of lubrication, and the friction falls as low as .05 or .03 of the pressure, and probably still lower. The polished surfaces operated in these favorable conditions, became more and more perfect, and it is not surprising that the friction should fall far below the limits above indicated.

These reflections show how useful are oiling fixtures in diminishing the friction, which, in certain machines—as mills with complicated mechanism—consume a considerable part of the motive work. We cannot, then, too much recommend the use of appliances to distribute the unguent continuously upon the rubbing surfaces of machines, and it is not surprising that a great number of dispositions have been proposed for this purpose within a few years. We should be careful to select those which only expend the oil during the motion, excluding those which feed by the capillary action of a wick of thready substances. These constantly drain the oil even during the repose of the machine, thus consuming it at a pure loss.

The results obtained from the experiments at Metz on the friction of journals are condensed in the following table:—

Friction of Journals in Motion upon their Pillows.

Surfaces in contact.	State of surfaces.	Ratio of friction to the pressure when the unguent is renewed.	
		in the common way.	continuously.
Cast iron journals in cast iron bearings	unguents of olive oil of lard, of tallow, or of soft coom	0.07 to 0.08	0.030 to 0.054
	with the same unguents and moistened with water	0.08	
	asphalte	0.054	
	unctuous	0.14	
	unctuous and wet with water	0.14	
Cast iron journals on brass cushions	unguents of olive oil, of lard, of tallow, and of soft coom	0.07 to 0.08	0.03 to 0.054
	unctuous	0.16	
	unctuous and wet with water	0.16	
	slightly unctuous	0.19	
	without unguent	0.18	
Cast iron journals on lignum vitæ bearings	unguents of oil or lard	0.10	0.090
	unctuous with oil or lard		
	unctuous, with a mixture of lard and black lead.	0.14	
Wrought iron journals on cast iron bearings	unguents of olive oil, tallow, lard, or soft coom	0.07 to 0.08	0.030 to 0.054
Wrought iron journals on brass bearings	unguents of olive oil, tallow, lard	0.07 to 0.08	0.030 to 0.054
	ungents of soft coom	0.09	
	unctuous and wet with water	0.19	
	slightly unctuous	0.25	
Iron journals on lignum vitæ bearings	unguents of oil or lard	0.11	
	unctuous	0.19	
Brass journals on brass bearings	unguents of oil	0.10	
	unguent of lard	0.09	
Brass journals on cast iron cushions	unguents of oil or tallow		0.030 to 0.052
Lignum vitæ journals on cast iron cushions	unguents of lard	0.12	
	unctuous	0.15	
Lignum vitæ journals on lignum vitæ cushions	unguent of lard		0.07

The examples contained in this table suffice to show that the friction of journals is in itself subject to the same laws as that of plane surfaces; but they also show the great influence which the constant renewal of the unguent possesses in diminishing the value of the ratio of the friction to the pressure, which sometimes falls as low as .025.

We see also that the diameter of the journals seems to have some influence upon the more or less complete expulsion of the unguent, and consequently upon the friction, so that the dimensions to be given them should not be determined from a consideration solely of their resistance to rupture.

Recapitulating the summary of the experiments which I have made upon the friction of journals, shows that it is nearly the same for woods and metals rubbing upon each other, and that its ratio to the pressure may, according to the case, take the values given in the following table:—

State of surfaces.	Friction.
With rotten-stone and perfectly greased	0.025 to 0.030
Continually supplied with ungent	0.050
Greased from time to time	0.07 to 0.08
Unctuous	0.150

It is not true, as is generally supposed, that the friction is always less between substances of different kinds than between those of the same kind. But it is well, generally, to select for the rubbing parts granulated rather than fibrous bodies, and especially not to expose the latter to friction in the direction of the fibers, because the fibers are sometimes raised and torn away throughout their length. In this respect, fine cast iron, which crystallizes in round grains, as well as cast steel, are very suitable bodies for parts subjected to great friction. Thus, for several years past, a cast iron packing has come into very general use for the pistons of steam engines. If for the boxes of iron or cast iron axles, brass continues in use, it is chiefly because it is less hard, and wears out before the axles, and because it is easier to replace a box than an axle.

In very light mechanisms, and especially with very rapid motion, the viscosity of the unguent may offer a resistance similar to that produced by friction proper; in such cases, the results of experiments made under considerable pressures in relation to the surfaces of contact, should only be applied with extreme caution.

THE EXPANSION OF METALS.

The members of the Polytechnic Association of the American Institute, this city—as will have been seen in our regular reports of their transactions—have occupied several evenings in discussing the question of "the expansion of metals." We regret to state that, thus far, they have given the public no new and useful information on the subject, but have rather confused the commonly received and reliable opinions that have been propagated by several authors, and adopted from observation and experiment. The great evil of promiscuous discussion is the liability and inclination of many persons to say something, whether it is to the point or not; and a tendency is thus frequently given to direct attention from the real objects under discussion. This appears to have been the case regarding the expansion of metals. The amount and direction of the expansion of iron are pretty well known, and can be found in every treatise on heat that is published; but when cast iron, as a material for buildings, was brought before the attention of the Polytechnic Association, quite a number of the members could not conceive how it was possible to apply it in a suitable manner for such a purpose, because metal expanded with heat and contracted with cold. It was in vain they were told that cast iron buildings, which had been erected in this city 12 years ago, were as firm to-day as when first put up, and that the summer's heat and winter's cold had never injured a seam, plate or pillar. Rather than believe this, some of the members rambled in imagination over the whole earth to bring proofs against the statement. There was evidence of the assertion being true to be found within the very shadow of the building on which they were speaking, but they seemed to be perfectly oblivious of the fact.

It surprises us that the adaptability of iron for buildings, under many circumstances, can be questioned for a moment on account of its expansibility by heat. It is well known that this metal expands and contracts with atmospheric heat and cold, but when properly arranged it is not affected detrimentally thereby. The huge iron frames and parts of marine engines are subjected to great variations of heat and cold, and to great strains and concussions; their journals and bearings must be kept unaltered in line, or some part of the machinery will break down. If the opinions expressed by some of the members of the Polytechnic Association were true regarding the effects of expansion in iron structures, wood, brick, or even chinaware would be preferable to iron for such purposes; but they are not true, as thorough experience has well settled. The different parts of engine frames and iron buildings can be, and are, so arranged as to be practically unaffected by expansion and contraction from changes of atmospheric temperature.

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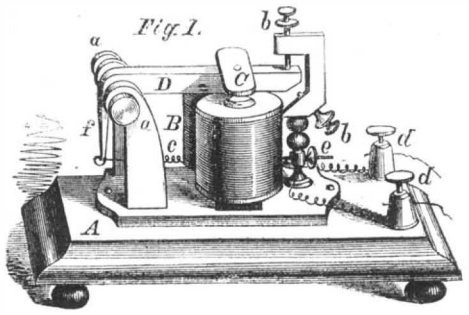
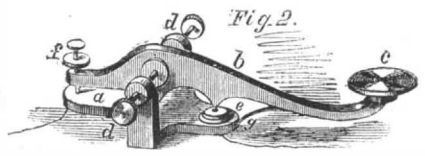
MODERN TELEGRAPHY.

The electric telegraph is one of the most useful and wonderful of modern inventions. In its simple nature, it consists in conveying and receiving messages by galvanic lightning. Slender wires are erected all along our highways; these are made the avenues of public thought, and have received the appropriate name of "electric nerves." It is only 16 years since the first short telegraph of 44 miles was laid on our continent between Washington and Baltimore; now there are about 54,000 miles in operation. These wires interlace our hamlets, towns and cities, and, in the same manner as the impulses of the human mind are conveyed along the nerves of the body, so are the volitions of the public mind communicated by telegraphic instruments along the "electric nerves" which ramify the national telegraphic system. A very great advancement has been made in the art of electric telegraphing within a few years; old telegraphic arrangements, that were once held to be about

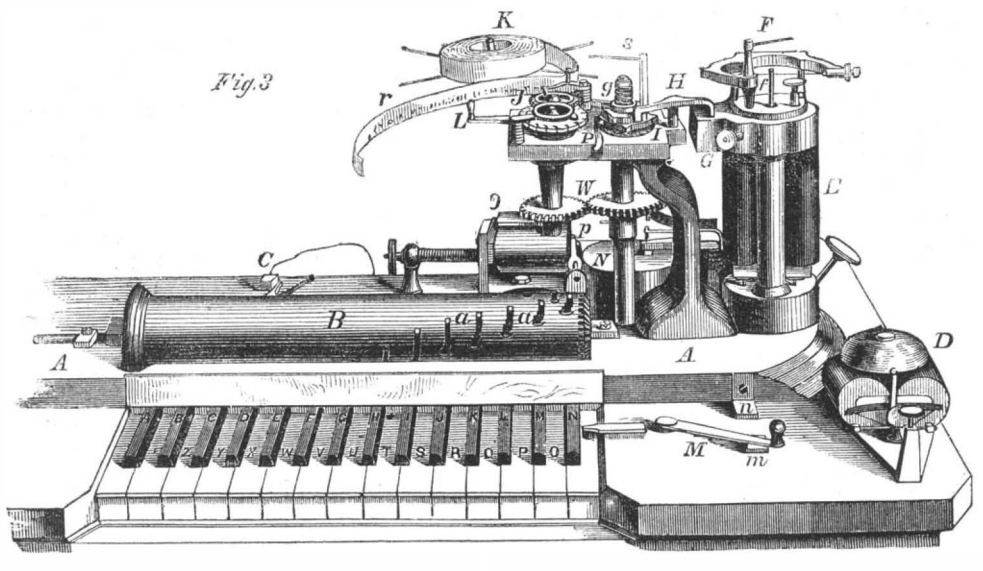




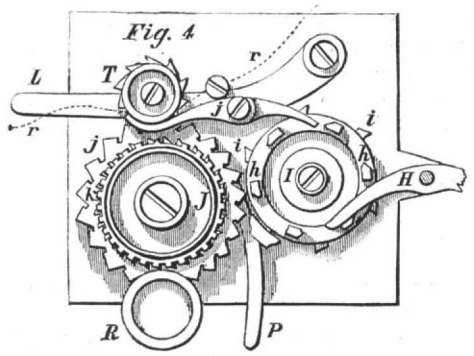
perfect, have given place to new and more simple agencies. It is our purpose in this article to describe some of these changes, and the means and instruments now most generally used, so as to convey accurate information of the art as now practiced in this country.

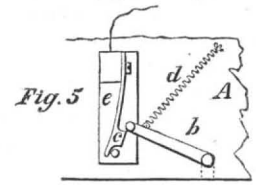
The first telegraph ever erected in the United States was that of Professor Morse; and, as originally employed, its principal feature (and the one that was held to be most valuable) consisted in the use of an electro-magnet, which vibrated a pen-lever so as to produce visible marks on a strip of paper moved by clock-work. This instrument is still used in its most elementary form, but the clock-work is removed, and all of it has been reduced to the beautiful and simple devices represented by Figs. 1 and 2; the former being an electro-magnet with a sounding pen-lever—the latter being the key for breaking and closing the circuit. It is a fact not generally known, that most of the telegraphing in this country is performed by *sound* alone; nearly every recording apparatus at the principal stations has been superseded by a simple "sounder."

The second accompanying illustration represents the lever key used for transmitting communications; *a* is the brass base, firmly secured to the table by screws. The lever, *b*, is suspended between the combination screws, *d d*. At *e*, a piece of ivory is inserted in the base, *a*, through which rises a brass pin with a platina point. The ivory serves to insulate the brass pin from the base. One of the line wires is attached to this pin, and the other to the base, *a*. When the ivory button, *c*, is pressed down by the finger of the operator, the platina point is brought in contact with a similar one on the underside of the lever, *b*, completing the electric circuit. When the finger is withdrawn, the spring, *g*, raises the lever to its former position. The screw, *f*, regulates precisely the amount of motion that the operator desires the lever to have. Fig. 1 represents the improved sounder or receiving instrument, constructed by Messrs. Chester, of this city, to whose skill and ingenuity the telegraphers are indebted for many valuable improvements in their apparatus. The electro-magnet, B, is firmly secured to the base, A, which is about four inches in length and two in breadth. The ends of the coils of wire surrounding the magnet are secured to the binding screws, *d d*, into which the conducting wires are inserted. When the key (Fig. 2) is pressed down at a distant station, the electric current passes over the line and around the soft iron of the electro-magnet, causing it to become magnetic and to attract the iron armature, C (Fig. 1), attached to the lever, D, which is suspended upon its axis by set screws, *a a*. When the current ceases to flow, the magnet instantly loses its attractive force, and the spiral spring, *c*, attached to the arm, *f*, of the lever elevates it to its former position. Thus, it will be seen that the movement of the lever, D, in all cases, corresponds with that of the finger key at the other station. The lever, D, in its vibrations, strikes the screws, *b b*, producing a loud, clear sound, by which the operator in any part of the room can hear and understand anything passing over the line. The tension of the spring, *c*, is adjusted by the screw, *e*, according to the strength of the current. In practice, the current is usually too weak after its long journey to work the sounder with energy; on entering the office, therefore, it is conducted into a "receiving magnet," similar in principle to the sounder, but more delicately constructed. A platina point is placed on the screw, which the lever strikes when attracted by the electro-magnet, and the contact completes the circuit of a powerful local battery connected with the sounder. A very slight movement is sufficient to open and close the local circuit, and it may be effected by an extremely feeble current. The ordinary Morse "alphabet" is used, consisting of dots and dashes; and it will be easily understood that each distinct sound will be readily distinguished by the practical operator. The lightning holds converse with man, speaking a language of its own, as distinct and intelligible as any other. Of all the mysteries of the telegraph, this is the most wonderful and sublime.



The first printing telegraph was invented in America, in 1837, by Mr. Alfred Vail. It was unable to print more than eight or nine letters per minute, and never was practically used; but the printing telegraph invented by Royal E. House, and patented in 1846, proved to be a success. This wonderful instrument stood unequaled, in many respects, for a period of 10 years, until the introduction of the Hughes instrument, which was patented in 1856. The novelty of this instrument consisted in printing by the combination of a permanent with an electro-magnet, acting upon a *continually-revolving* type wheel, printing while in motion; also, in printing a letter with each "wave" of electricity, while the House instrument required from 1 to 14 waves for each letter (the type wheel stopped as each letter was printed). In the winter of 1858–'59, a new instrument was invented by A. A. Lovett, of this city, combining the most valuable points in the House and Hughes patents, and it has been introduced with great success on nearly all the lines formerly using the House and Hughes machines. This "combination instrument," as it is termed, has the advantage of being able to work through a much longer circuit than House's, and of being more simple in its construction. A perspective view of it is shown in Fig. 3. In order to be more easily understood, we shall first describe the manner in which the operator prints on his





own instrument, and then show the manner of communicating with other stations. The principal features of this machine are the composing parts, the printing devices, the electro-magnet, a manual power which sets the machinery in motion and a governor to regulate the speed correctly. A composing and a printing instrument is required at every station; the printing apparatus is distinct from the circuit, but the composing portion is included in, and forms part of, it. These are all arranged on a table about three feet in length and two in breadth. The manual power is distinct from the electric circuit, and consists of a shaft turned by a treadle, and an air pump for forcing compressed air into a reservoir beneath the table. These are not shown in the figure. The composing machinery (shown in Fig. 3) consists of a keyboard (shown in front) having 28 keys, marked with the letters of the alphabet, and a dot and "space." The ends of these keys correspond to an equal number of slots, *a a*, arranged spirally around the composing cylinder, B, which is kept revolving by a band and pulley at its left end. When a key is pressed down, and its corresponding slot is brought round to it, it enters the slot and is forced aside by its peculiar form, thereby acting on the lever, *b* (Fig. 5), and bringing it in contact for an instant with the spring, *c*, and closing the electric circuit. When the slot has passed, a spring, *d*, restores the lever, *b*, to its original position. The gutta-percha block, *e*, insulates the spring, *c*, from the bedplate, A. This arrangement, called the "circuit closer," is seen at C, in Fig. 3. The electrical pulsations are conducted to the electro-magnet, E (Fig. 3), the armature of which forms a valve, which is hung by a stem, *f*, upon a slender wire forming a spring, the tension of which is adjusted by a lever and screw, F. The vertical movement of the valve admits the compressed air from the reservoir beneath the table alternately into each end of a chamber, G, as the valve rises and falls under the action of the spring and of the electro-magnet. A piston, moving air-tight in the chamber, G, operates the printing machinery by means of a lever, H. Fig. 4 shows an enlarged plan of the printing machinery, in which the same letters of reference indicate like parts. When the valve is attracted by the electric magnet, the piston, acting on the escapement lever, H, releases one of the six pins, *h h*, of the *timing* wheel, I, which is moved by a friction attachment, *g*, so that it can be stopped at pleasure without interfering with the movement of other parts. The type wheel, J, is simi-

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larly arranged. When the pin, *h*, is released by the escapement, H, the timing wheel will perform one-sixth of an entire revolution. In doing this, one of the points, *i i*, interlock with the teeth, *j*, of the type wheel, causing it to be held firmly while still in motion; while another of the pins, *h h*, act on a lever, *j'*, forcing the printing roller, T, carrying the paper ribbon, *r*, against the letter opposite it upon the type wheel, as it passes. The type are arranged around the wheel, J, so as to correspond with slots, *a a*, in the composing cylinder, B (Fig. 3); and as the type wheel is geared by cog wheels, W, to the cylinder, so as to revolve in the same time with it, it is evident that, if the type wheel were set with any letter opposite the printing roller, T, at the same time the key of that letter entered its corresponding slot on the cylinder, B, the circuit would be closed at every revolution of the cylinder at the exact instant the letter was passing the roller, T, which would be forced against it in the manner before described. Any other key being pressed down would, in like manner, print its corresponding letter upon the strip of paper. Therefore, in order to communicate with any other station—say from New York to Boston—it is only necessary that the type wheel at that station should revolve *precisely* at the same rate as the composing cylinder at the transmitting station, which, being connected with it in the same manner by the electric current, would operate with the same effect as if it were a part of the same machine. This explains how all the different letters are printed at the station with one wire—an operation which, at first sight, is difficult to understand. This coincidence of motion is effected by a most ingenious governor, the invention of the American Telegraph Company's machinist—G. M. Phelps—consisting of a drum, N (Fig. 3), geared to the cylinder, B, and moving with it, but much faster. If this drum revolves too rapidly, the increased centrifugal force acting on a detached portion of the drum causes it to move a series of levers inside, raising a spring which closes the circuit of a local battery through the electro-magnet, O, and applies a brake, *p*, to the drum, instantly reducing the speed to its required limit. The speed of the governor is adjusted to correspond with other stations by a lever and screw, *s*. The "caller" or sounder, D, gives notice that a communication is to be sent. The roll, K, supplies the paper which is drawn forward by teeth, *k* (Fig. 4), on the type wheel, which interlock with similar ones on the roller, T, at the instant a letter is printed. The type are inked by the roller, R. The switch, M, conducts the current through the caller, D, or electro-magnet, E, as may be desired, by means of anvils, *m n*. The lever, P, stops the type wheel at the "space" when a communication is to be received, so that the person sending, by commencing with the space key, brings the instrument into correspondence as the type wheel is released by the first movement of the wheel, I. The lever, L, serves to throw the lever, *j'*, out of connection with the pins, *h h*, so as not to print when sending to other stations.

The "combination instrument" is the fastest and most accurate in the world. It produces a letter with only one electric wave; while the Morse instrument requires, on an average, three-and-a-half waves, and the House telegraph still more than this. Its ordinary rate of operation produces about 2,000 words per hour, and it can be worked much higher. It is believed, by old and experienced telegraphers, to be in advance of every other telegraphic instrument in the world.

In our next number, we shall give a description of the great telegraphic establishment belonging to the combined association, in this city. The patent of Professor Morse (lately extended for seven years) was for the method of operating local circuits by the main current; that of Professor House was for his instrument patented in 1846.

SULPHURIC ACID FROM PYRITES.—The *Revue Universelle* says that sulphuric acid is now manufactured in Harz from iron and copper pyrites. An apparatus was constructed at Ocker, in 1841, and proved so successful that the manufacture has been constantly extending ever since. The mineral used contains about 20 per cent of copper and 80 of iron pyrites, the sulphur constituting 50 per cent. The *Revue* has a full description of the process, with drawings of the apparatus, in the March number, to which we refer such of our readers as may desire to inquire further into the matter.

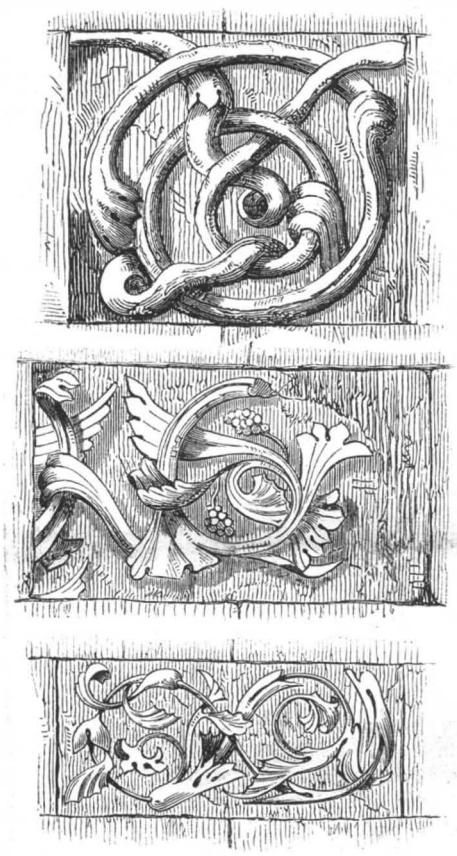
ARCHITECTURE IN THE HOLY LAND.

We extract the following letter, with engravings of the curious drawings, from the London *Builder*:—

The three sketches of sculptured stone on this page are from the inner court of the Latin Convent at Nazareth. They are built here and there into the modern stone wall, over and near to the archway which leads directly to the principal entrance to the celebrated Church of the Annunciation, without any regard to uniformity, but as merely to preserve them as relics of some former buildings.

If they tend to testify the early existence of Christian art in Nazareth, it will be interesting to see whether historic records throw any light on the period of their execution, for they seem to be of various styles and epochs.

We find that there were in Nazareth no Christian inhabitants till the time of Constantine, and no Christian pilgrimages to it till the sixth century.



In the seventh century we hear of two churches existing in Nazareth, one over the fountain where a Greek church now stands, and the other over the supposed house of Mary, called the church of the Annunciation.

After the capture of Jerusalem by the Crusaders, Tancred, who was made governor of the province of Galilee, built a church at Nazareth. In 1263, this church was laid in ruins by Sultan Bibars, and continued so for nearly four hundred years.

In 1291, Nazareth was taken by the Sultan Khaleel, when he stormed the neighboring city of St. Jean d'Acre. From this time, for a long period, Palestine was closed to Christian pilgrims and architects.

In 1620, however, the Franciscans obtained permismission from the renowned Fakhr-ed-Deen, to rebuild the church on the original site, and to take possession of the grotto of the Annunciation; from whence it is believed by the Latins that the house of the Virgin had been removed to Italy.

It is said that these Franciscans found among the ruins the fragments I have sketched here. Can they be relics of the church of Tancred, or of an earlier shrine upon this consecrated site?

There are other remains which bear the stamp of thirteenth century feeling, especially a curious cat-like monster, twining about grotesquely, with his hind leg over his head; it is carved on the key-stone of an arch, and is now introduced in the modern gateway leading from the outer to the inner court of the convent.

There are several old columns of red sienite near the church door, and a few carved capitals lying about.

From the time that the Franciscans began their work, under Fakhr-ed-Deen's protection, when the present church rose out of the ruins, the convent has been ever increasing in importance and wealth.

The church is about 70 feet square; the walls and piers are covered with canvas hangings, painted in imitation of tapestry; all the alabaster carvings and decorations, which really belong to the modern building, are, though very elaborate, bad in design, and executed without intelligence.

I tried to glean some information from the superior, but he was no archæologist; he, however, gave me every facility in my examination of the convent buildings, in the spring of the year 1858.

About a quarter of an hour's ride from the city of Jerusalem, in a rocky and lonely valley, stands the "Convent of the Cross," lately very thoroughly restored by the Greeks, to whom it now belongs. An excellent college has been established there for forty or fifty students.

It was formerly the property of the Georgians, and was founded by them, in the fifth century, on the very spot where grew the tree which furnished the wood of the cross. This, at least, is the tradition.

The building stood in ruins for a long period, but much of the ancient portion is still carefully preserved. The old church is about 70 feet long, and is divided into nave and aisles by four massive piers, supporting pointed arches and a groined roof. The walls are covered with curious and quaint frescoes, and the altar-screen contains a pictorial history of the sacred tree, from the time when it was planted by Abraham and Lot till it was hewn down and formed into a cross. In a dark, damp, rocky cavern, under the altar, an opening is shown as the identical spot of its growth.

As sculpture is strictly forbidden by Georgians and Greeks, all the decorations depend on color; but, in some of the pictures, the figures are cut out in thin wood, painted and mounted on appropriate backgrounds. The nimbus is generally of gold, and many stones and jewels are introduced in the adornment of the dresses.

Under the dome is a large square mosaic pavement, the finest I have met with in Palestine; quaint birds and curious figures and Christian symbols are represented, and in the lozenge-shaped spaces, left by the intersecting lines of the framework of these devices, beautiful designs are introduced. The tesseræ of which this pavement is composed are about three-quarters of an inch square, and are black, white, red, blue, and yellow.

MARY ELIZA ROGERS.

BELTS FOR DRIVING MACHINERY.

MESSRS. EDITORS:—On page 150 of the present volume of the SCIENTIFIC AMERICAN, the above subject was discussed in a couple of interesting letters, the substance of both of which is very correct; but on page 197 another correspondent (writing from Dayton, Ohio) makes assertions which suggest some comments. He says there is room for difference of opinion (and I for one cheerfully grant it), and that his experience of over 20 years has taught him different facts. He states that he ran the smooth or hair side of a belt next to pulleys, but dropped it, because the strength of leather lies on the hair side and in one-fourth of the belt's thickness, and this, when worn out, makes the belt "not worth a straw." He then goes on to say: "I now use the rough or flesh side;" and then gives his method of treating them with dubbing, &c.

The wearing of belts depends altogether on circumstances. If they adhere well to the pulleys and there is no slipping, but a continued adhesion while at work, leaving the pulleys clear, there is no perceptible wear while running with the hair side to the pulley; but put the rough or flesh side to it, and the wearing of it will soon occur from friction caused by slipping on the pulleys. While speaking of the wearing of belts, I will give some of my experience, which has been constant for over 30 years; and during that time I have never yet had a belt to wear off in the hair surface, when the belt worked clear and adhered to the pulley as it should do. In confirmation of this, I will here state that we have now (and have had for the past 12 years) a driving belt 12 inches in width, running with the hair side next the pulley, at an angle of about 60 degrees. It has never given us any trouble during that time, and has only once been taken down for repairs of any kind. In this case some of the rivets were replaced, and it was then put to work immediately. Our machinery driven by it consists of 44 woolen looms and the necessary carding and spinning "fixings," requiring from 18 to 20 horse-power at the

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very least. It shows no wear on the running side, but looks as well as when first put on. I believe it is conceded by all that we have but two objects in view in putting any grease or dubbing on leather—the one is to soften, the other is to preserve it. We all likewise know that leather will crack if it does not get some grease on; and this always take place on the hair side when it is not kept soft. And as it forms the largest circle when on the outside of a pulley, it must crack very soon. This may be proved by taking a piece of harness or leather of any kind and lapping it over the finger with the hair side out, when, if it is very dry, it immediately cracks. This is the position of a belt with the smooth side forming the larger or outer circle, which is evidently disadvantageous. Oiling on the flesh of a belt is the way to facilitate the rot in leather, as it will absorb almost any amount of grease when put on, owing to its spongy nature; and as it melts at a temperature of 75° to 80° (the heat we keep all our woolen and cotton factories), it would leave the surface too soft and porous, and serve to cause rot.

Your Dayton correspondent also states that his belt was originally 10 inches wide, but is now 9 inches. This I consider a great shrinkage, but it is easily accounted for when the grease is put on the flesh side. The belt to which I have referred has an angle of about 60 degrees, yet it has given entire satisfaction during 12 years, doing its work well at all times, and, I might add, has the appearance of doing so for years to come. The same correspondent concludes his argument by saying his belt never slips, and would pull down the shafting first. To the former of these assertions I will say it is almost impossible for a belt to slip running horizontally with the slack side up, and sagging (as he says it does) a foot on the top when doing full duty. All who are acquainted with such matters know that that is the most favorable position a belt could have.

Finally, let me say that my experience with belts has led me to conclude that, when they are run with the *hair* side placed next to the pulleys, they drive 33 per cent more machinery and run more steadily than when reversed. D. I.

Philadelphia, Pa., May 22, 1860.

AMERICAN NAVAL ARCHITECTURE.

[Reported expressly for the Scientific American.]

THE STEAMER "VENCEDOR."

This steamer was constructed for the "Magdalena Steam Navigation Company" of South America, to run over the rapids on the Magdalena river at Honda, in that country. The hull was built by Messrs. Samuel Sneeden & Co., Greenpoint, L. I.; it was put together with screw bolts, and taken apart for shipment to the port of Savanillia, S. A., for re-erection there. The machinery was constructed by Messrs. H. Ester & Co., of Brooklyn. As much interest is generally felt regarding the construction and destination of steam vessels in the United States, for parties, in other countries, we will publish minute particulars of the essential elements of the hull and machinery of this vessel:—Length on deck, from fore-part of stem to after-part of stern post, above the spar-deck, 156 feet 6 inches; length between perpendiculars, 150 feet; breadth of beam at midship section, above the main wales (molded) 24 feet; depth of hold, 5 feet 3 inches; draft of water at load line, 3 feet 6 inches; area of immersed section at above load draft, 820 feet. Her frame is of yellow pine, sided 4 inches, molded 6 inches, and 24 inches apart from centers. Bottom planking, yellow pine, 2½ inches thick: sides, of same material, 2 inches thick; promenade deck, made of white pine, 1 inch in thickness. Cargo deck, and hurricane deck made of same material, the former being 2 inches in thickness, and the latter ¾ of an inch in thickness. The pilot-house is on the hurricane deck, 35 feet above the level of the sea.

The *Vencedor* is fitted with two inclined direct engines, diameter of cylinders (two), 16 inches; length of stroke of piston, 6 feet; has one stern wheel, whose diameter over boards is 16 feet; length of wheel blades, 17 feet; number of buckets of same, 15; their width, 15 inches. She is also supplied with one locomotive boiler, to be situated in hold; length of this, 18 feet 8 inches; breadth, 8 feet 4 inches; and its hight, exclusive of steam chimney, is 7 feet 8 inches. This boiler contains two furnaces, the breadth of which is 43 inches; length of fire-bars, 6 feet; whole number of tubes in boiler, 138; length of same, 12 feet, and their internal diameter is 3 inches; grate surface of furnaces, 43 square feet; heating surface, 1,500 square feet. Maximum pressure of steam, 120 pounds; maximum revolutions at this pressure, 35. The cutting-off is performed by variable link motion.

Thr cylinders of the engine are to be placed on the after-gunwale of the steamer; the shaft is of wrought iron, 9½ inches in diameter at body; the journals are 8¾ inches in diameter; piston rods of steel, and the distance between centers of engines athwartship is 22 feet. She has two masts, and will be, when put together, a very superior boat in every respect, and a model for others of its character where like results are required.

THE STEAMER "FLUSHING."

This steamer was constructed by Messrs. Samuel Sneeden & Co., Greenpoint, L. I., for the route between New York City and Flushing, L. I. We herewith annex full particulars of the hull and machinery:—Length on deck from fore-part of stem to after-part of stern-post, above the spar-deck, 161 feet; length at load line, 155 feet, 6 inches; breadth of beam at midship section, above the main wales (molded) 27 feet; depth of hold, 8 feet; draft of water at load line, 4 feet; area of immersed section at this draft, 86 square feet; tunnage, 323 tuns. Her hull is of iron, 5-16ths of an inch in thickness, and is securely fastened with rivets ⅝ of an inch in diameter, at a distance of 2½ inches apart. Distance of frames apart from centers, 20 inches; shaped L, and their depth 3 inches; width of web, 5-16ths of an inch; width of flanges, 3 inches. The cross floors are 12 inches in depth by ¼ of an inch in thickness, and are connected with every other frame.

The *Flushing* is fitted with a vertical beam condensing engine, diameter of cylinder, 36 inches; length of stroke of piston, 10 feet; diameter of water wheels over boards, 26 feet; material of same, iron; length of wheel blades, 6 feet, 9 inches; number of blades, 22.

She is also supplied with one return tubular boiler, whose length is 24 feet; extreme breadth, 10 feet: shell, 8 feet, 6 inches; location in hold; number of furnaces, 2; breadth of same, 4 feet 6 inches; length of fire-bars, 7 feet; whole number of tubes above, 140; whole number of flues below, 10; internal diameter of tubes above, 2¾ inches; internal diameter of flues below, 6 of 12 inches, 2 of 9 inches and 2 of 13 inches; length of tubes above, 10 feet. The hight of smoke pipe, above grate surface, is 50 feet; diameter of same, 42 inches; area of heating surface in boiler, 2,200 square feet. The maximum pressure of steam is 50 pounds, and point of cutting-off, 5 feet; maximum revolutions at above pressure, 27. She has three water-tight bulkheads; one independent steam fire and bilge pump; draft at time of launching, 2 feet 2 inches; weight of iron in hull, 136,000 pounds; depth of keel, 3 inches; ½ an inch thick, and shaped U; has two box keelsons, and four plate keelsons running fore-and-aft. The builders of her machinery are the proprietors of the Morgan Iron Works, in this city; and her owners are the New York, College Point and Flushing Steamboat Company.

AN EXTRAORDINARY ANNOUNCEMENT!

FORTY-SEVEN PATENTS ISSUED THROUGH A SINGLE AGENCY IN ONE WEEK.

Soon after the removal of our offices to No. 37 Park-row, and the association with us of Hon. Chas. Mason, formerly *Commissioner of Patents*, we announced our facilities ample for conducting the entire patent business of the United States. We did not then suppose, however, that, in so short a period as up to the present time, we should be doing one-half of the business, notwithstanding our capability of doing the whole; but we are happy to state that the time has arrived when almost *one-half of the entire patent business of the country is conducted through this agency.* The official list of claims, published under the appropriate head in another part of the present number of the Scientific American, bears us witness in this assertion.

The total number of patents issued for the week ending May 22d, was one hundred and eight; out of this number, *forty-seven*—or nearly one-half—were patents which were solicited through this office; being a larger number (we have no hesitation in asserting) than was ever before issued to the clients of a single agency in one week. We would re-iterate the assertion that we have ample facilities for attending to the *entire* patent business of the country; and our patrons may rest assured that, under our perfectly-organized system of doing business, the same critical attention is paid to *each* case which is intrusted to our management as if we had but a single application to prepare in a week.

We append a few complimentary letters received from different parts of the country within a few days, to the perusal of which we call the attention of such as are about to apply for Letters Patent:—

Messrs. Munn & Co.:—You will please accept my thanks for the promptness and dispatch you manifested in procuring my patent for pipe-molding machinery. I received my papers yesterday; consequently, you will see, by referring to the date on which I left my model at your office (March 26th), that it has all been done in less than six weeks. Considering that my invention was a complicated machine, and that one of the claims was rejected and the papers had to be sent back to New York for alterations, I think you have done up my business in "A No. 1" style and at railroad speed. I will advise all inventors that I may come across to give their business to your office by all means. You recollect that I took my case from ——, after he had kept it in his office for six weeks; while *you* have only taken the same time to get it through the Patent Office that it took him to get his papers ready. If I ever have any more business of this kind, you may depend I shall know where to get it done from this time forward.

William Doyle.

Albany, N. Y., May 8, 1860.

Messrs. Munn & Co.:—I am in receipt of your note giving me the information that the application made through your agency has met with success, and also am in receipt of the Letters Patent from Washington. Accept my sincere thanks for the promptness and ability with which you have conducted my case. I can cheerfully unite my humble voice to scores of others in recommending your agency in all business connected with the Patent Office. The promptness and dispatch with which all communications are attended to, and the concise and comprehensive form in which the claims, &c., are arranged, are sufficient guarantee to insure success to any applicant. I am much pleased with the drawings, for they exactly represent the very idea I wanted to convey. All to whom I have shown the "papers" are greatly pleased with them; and since I conceived the idea of the "guard," some five or six persons have been induced to concentrate their thinking faculties and "try their luck" at the patent business as inventors. Two have already obtained patents through your office, and the others are still hard at their contrivances. As to the Scientific American, I wish my efforts could make it universally read; for I think there would then be a more general appreciation of the arts and sciences, and mechanics would be admitted to that position in society which is justly their due. B. S.

Portsmouth, Va., May 9, 1860.

Messrs. Munn & Co.:—I hasten to acknowledge the receipt of your favor of April 30th, containing the gratifying intelligence that my Letters Patent are granted. My thanks to you, for the speedy and efficient manner in which you have conducted my case, are more abundant than words can express. My first knowledge was that my invention was a *valuable* one; and I now know that the right is granted whereby I can obtain that value, which is, of course, exceedingly gratifying. My influence for the future shall be directed in your behalf. You will soon receive another case from—

N. S. Gilbert.

Albion, N. Y., May 1, 1860.

Messrs. Munn & Co.:—Your letter announcing our good fortune has been this day received. Many thanks to you for the skill and energy which you have displayed in obtaining a patent for us. We had expected such a result, notwithstanding the case had been twice rejected; because we believed you to be above the too common trick of attorneys of holding out false hopes to their clients. We hope this is not the last patent we shall have the pleasure of obtaining through your agency, and wish you success both as patent-attorneys and editors of the Scientific American.

Church & Ellsworth.

Birmingham, Conn., May 1, 1860.

Messrs. Munn & Co.:—I have the great pleasure of acknowledging the receipt of my Letters Patent for reversing cultivator teeth. This case was presented to the Patent Office some six months ago; but owing to defects in my specification and claim, the application was rejected. No doubt many inventors, who have undertaken (as I did) to prosecute their own applications, have experienced the same results and abandoned their just rights in a valuable invention, when a patent might have been obtained had they employed competent attorneys. It is two things, to *invent* and to *secure a patent.* The energy with which you prosecuted my case to a successful termination and the ability exhibited in framing my specification and claims show your devotedness to the inventor's rights, and that you richly merit your extensive reputation. Heman B. Hammon.

Bristolville, Ohio, April 19, 1860.

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POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported expressly for the Scientific American.]

On Thursday evening, May 17th, the usual weekly meeting of the Polytechnic Association was held at its room in the Cooper Institute, this city; Major Serrell in the chair.

MISCELLANEOUS BUSINESS.

Solid Emery Vulcanite.—The New York Belting and Packing Company exhibited specimens of emery vulcanite tools, such as grinding and polishing wheels, files, hones and scythe rifles, composed of vulcanite or hardened rubber and emery. The rubber is "masticated" with emery of the proper degree of fineness, and, while plastic, is molded into the desired form. Then, by the ordinary vulcanizing process, the rubber is hardened. The chief advantages claimed for such tools are that the whole substance being homogeneous, they will not wear out so soon, and that they are capable of being remodeled by heat. The exhibition was accompanied by a paper showing the importance of abrading tools, and the peculiar fitness of emery vulcanite for making them.

Jointed Crane.—Mr. Webb exhibited for the inventor—J. Y. Parce, of Fairport, N. Y.—a model of a new hoisting crane. The peculiarity of this crane is that the boom is provided with a joint, so that the crane may be operated in a narrow space; a weight may be taken up anywhere within the circle described by the extremity of the boom and deposited at any other point. To prevent the tendency to twist, in operating when an angle is formed at the joint, the parts are braced.

Man Tread-power.—Mr. Louis Koch exhibited a mowing machine to be propelled and operated by the hands and feet. The machine is a kind of wheelbarrow, to the front of which is attached a circular cutter. The novelty consits in the method of applying the power to the cutter. Dragging behind the machine and on the ground are two wide leather straps; these straps are so connected with the cutter that when one is stepped on, and the machine is pushed forward, the knives revolve. The operation of mowing consists in pushing on the machine, and treading alternately on the straps. The exhibition of this machine afforded considerable amusement, although a few of the members appeared to consider it as of serious importance. Themachine costs $10.

Mr. Burdett exhibited specimens of minerals taken from a copper mine near Fort Lee, which was worked during the last century. The metals of the specimens are copper, iron, lead and silver.

The chairman here announced the regular subject—"Expansion."

DISCUSSION.

Mr. Reed—A form of continuous rail has recently been patented in England, where no allowance has been made for expansion, and the invention is praised by the *Practical Mechanics' Journal*. During the past week I have measured the amount of expansion in a boiler 7 feet 6½ inches long, in raising steam to 50 lbs.; the increase in length was ⅛ inch.

Mr. Seely—It is understood that atoms of matter do not touch each other; some even have supposed that the spaces between them, proportioned to diameters, are as great as of the stars. The atoms are held in their position by a balance of the forces, attraction and heat; increase one or the other and the bulk of the body is contracted or enlarged. Now, what is the power of these forces, or what is the power of expansion by heat? The mechanical power of a given amount of heat is the same always, however or wherever applied. We only need a measure of quantity of heat, and to learn, once for all, the mechanical effect of the quantity we shall assume as the unit. Mr. Joule and others have recently determined with great accuracy the mechanical effect of heat, and have shown that the heat required to raise one pound of water from 55° to 60°, exerts a force, in expanding a body, of 772 "foot-pounds." It readily follows from this statement that 772 foot-pounds, whether of gravity or any other power would be required to rest and exactly balance the expansion from the amount of heat named. Thus we have a simple measure of the power of expansion in all cases, and also of the force required to compress a body. Also, we are better prepared to understand Mariotte's law, and to believe that it holds with liquids and solids as well as with gases.

The Chairman—It is stated in *L'Institut*, as the result of actual experiment, that electricity will not be conducted by a copper rod surrounded with air at 700 atmospheres pressure.

Professor Hendrick—At such a pressure, on account of its density, air itself should conduct nearly as well as copper. Perhaps the electricity found the air the easier road. But there would be practical difficulties in maintaining such a pressure.

Mr. Churchill—Water under pressure will flow where air will not.

Mr. Koch—The experiment was tried at the Novelty Works, and it was found that water could be made to pass through a considerable thickness of iron.

Mr. Seely—Heat is the source of nearly all the motion we see on the earth, and by virtue of its expanding power, the atmosphere under the sun is piled up in a mountain, flows away, producing winds, seeking rest. Except for expansion there would be almost universal stillness. In nature this motion of expansion and contraction is perpetual, and we may take advantage of these natural changes to produce on, a smaller scale, a machine that will go till it wears out. Make a large thermometer, the bulb of which shall hold a gallon, or more. In the tube have a float or piston attached, so as to raise a weight which shall drive a clock or a mill.

The Chairman—Such a machine would not operate well in regions where the range of temperature during the year is only a few degrees.

Mr. Seely—It would be necessary there to have a larger bulb, or a smaller mill.

Professor Hendrick—A useful philosophical instrument might be constructed on this principle. It would give the sum of all the changes of heat and cold. An instrument to measure the quantity of heat is a great desideratum.

Dr. Van Der Weyde, of the Cooper Institute, here exhibited an instrument for measuring expansion, and performed several experiments. The doctor also read from a German treatise a very complete table of the expansion of various metals.

Mr. Seely—It will be observed that the substances which boil or fuse at low temperatures expand most. Metals expand at a more rapid rate near their fusing point. The fact that melted cast iron contracts ⅛ inch to the foot, in cooling, is not surprising when we consider that it cools over 2,000°. Tin or lead cool through a range of only 500° or 600°.

Subject for next week—"Gas-burning.'

TRANSPLANTING EVERGREENS.—The late Mr. Downing—so distinguished for a fine taste in landscape gardening—was a great advocate for evergreens. His preference was for hemlock, white pine, Norway spruce and balsam fir. The latter is easily transplanted, and has a dark green foliage at all seasons of the year. The month of May, or the beginning of June, is held to be a favorable period for transplanting evergreens. The following is a method recommended for this purpose by the Baltimore *Rural Register*:—"A moist, cloudy day should be selected, and care must be taken that the extremely sensitive fibers which constitute the principal mass of the roots shall not be exposed, even in the process of removal from the nursery to the lawn, to the action of the sun and air, as their vitality principally depends upon their being kept shaded and moist. The great error which unskillful planters have committed, in attempting to get evergreens to grow, has been the depth to which they have set them in the ground. *They should invariably be planted shallow*, although the soil beneath should, first of all, be deeply stirred. Mr. Bright, of the Logan Nursery (Philadelphia), advocates *surface planting* for all kinds of trees, and the success which he has met with in this practice certainly appears to establish the truth of his theory. In transplanting evergreens of four or four-and-a-half feet high, he takes them out of the nursery with balls of earth eighteen inches deep and two feet in diameter. They are set *on the surface of the lawn*, in cavities of well-loosened soil; the cavities themselves being not more than three or four inches deep. The ball of earth, therefore, which incloses the roots of the evergreen thus planted, is still raised above the surrounding surface some twelve inches. They are, however, supplied with good loam, by which a mound is formed, and the ground is kept mulched for two years. This method is well worth a trial."

A COLUMN OF VARIETIES.

Coal-burning locomotives are increasing on northern lines. There are ten of this character now running on the New York and New Haven Railroad.

A large Crystal Palace, on the model of the London one, is about to be erected at St. Petersburgh, Russia. It is intended for a permanent exhibition of flowers and plants.

Several veins of nickel, nine inches in depth, are said to have been discovered in Chili; this is the first discovery of this metal in that country so rich in most of the valuable minerals.

By incorporating into melted steel from 2 to 5 per cent of tungsten, a superior alloy for cutting-tools is obtained. It is dense, hard and strong, and the tools keep their edge much longer than those made of common steel.

In Germany, wooden bridges are not allowed to be erected on any of the railroads, because they begin to decay from the very moment they are put up, and grow more insecure every day.

The suspension bridge over the Niagara river, at Lewiston (built by Major Serrell), is 1,042 feet span; this is 43 feet greater than any other single span in the world.

Copying-paper into which a very small proportion of copperas and common salt in solution have been introduced is superior to the common sort used for copying letters, as it requires but a very light pressure in copying, when the ink is of good quality. A little sugar added to common ink—black, blue or red—makes it fit for copying purposes.

A solution of tungstate of soda, of 28 degrees of strength, in Twaddell's hydrometer, mixed with 3 per cent of the phosphate of soda, will render cotton and linen fabrics uninflammable. About 20 per cent of crystallized tungstate of soda in water will answer for common use. If the outer garments of servants and children were treated with this substance, we would hear of fewer accidents from burning with camphene, fluid, &c.

Medals of different sizes have been made by M. Jacobi, of an alloy-compound of platinum and irridium. Some of these have been presented to the Academy of Sciences, in Paris. They were rolled cold without annealing, and are very ductile. This has excited surprise, as irridium is a most fractious metal, and such an alloy has not been thus fused before. It is not affected by aqua-regia when the quantity of iridium is 20 per cent.

Professor Jamin has recently delivered a series of lectures in the *Ecole Polytechnique* (Paris), in which he has performed experiments to show that the sap of plants and trees flow through the pores of those vegetable structures by capillary attraction, not by an inherent vital force, as has been generally believed.

The Academy of Sciences of Stockholm has granted a sum of $8,000 rix dollars banco (about $8,500) towards the expense of a scientific expedition to Spitzbergen and the adjacent polar regions, which has set out from Tromsoe (Norway). The expedition is headed by M. Torell, an eminent zoologist, and other men-of-science are attached to it.

The Illinois Central Railroad, at a town called Mattoon, is crossed by the Terre Haute and Alton Railroad. Every day, at about 2 P. M., are seen four trains coming from four different directions, arriving at this point at the same time, to a second, every day. They can be seen as they approach, for ten miles in each direction, the prairies there being a smooth, broad expanse, stretching away to the horizon without any inequalies to obstruct the sight. As these trains arrive, their cow-catchers approach to within twelve feet of each other, as though exchanging salutations, when gracefully backing, as though bowing an adieu, two of the trains go on the switches, while the other two scream away over the iron-bound prairie.

The Saut Ste. Marie ship canal, which unites Lake Superior with the lower lakes, was built by New York and New England capitalists. It is 5,694 feet long (the fall to be overcome was 17 feet); it has two lift locks, each 350 feet long, 61 feet wide at bottom, and 70 feet at top. Congress granted 750,000 acres of land to aid the company. In 1859 the receipts of the company were $17,400; the expenses, $5,600. The total valuation of the property which passed through it, last year, was $10,000,000. Most of this was copper ore and provisions.

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IMPROVEMENT IN GRINDING MILLS.

The reducing of grain to flour, either by grinding or pounding, must have been one of the first steps in the growth of the mechanic arts, and we learn from the old Egyptian paintings that this was effected by rubbing the grain between two stones long before the commencement of written history. Notwithstanding the great antiquity of this art, it has not yet reached perfection, and scarcely a week passes in which we are not called upon to procure a patent for some new improvement in grinding mills. Indeed, the sixty years of the present century have brought forth a larger number of these improvements than all previous time, and the last decade has been more prolific than any former one. The modern improvements, however, generally relate to some detail in the construction of the mill, such as hanging or adjusting the stones, lubricating the bearings, &c. But so extensive is the manufacture of flour, that these improvements, however slight, provided they do really effect a better operation of the mill, are of very great value.

The objects of the invention here illustrated are to secure a more perfect adjustment of the stones to each other, and a greater convenience in the lubricating of the joints. We give the inventor's own description:—

"A represents a cast iron frame, on the upper part of which is a cylindrical shell, B, to receive the runner or understone, C. This shell is of larger dimensions than the stone, C, so as to leave a space, *a*, all around and underneath the stone, C, as shown clearly in Fig. 1. The shell, B, has its upper edge made perfectly smooth and even, so that all parts of its surface will be in the same plane. The shell is cast in the same piece with the frame, A.

"In the lower part of the frame, A, there is placed a horizontal driving shaft, D, which has a bevel wheel, E, secured to its end. This wheel, E, gears into a bevel pinion, *a*, on a spindle, F, the lower end of which is stepped in a socket, *b*, the upper end of which has a flanch, *c*, around it. This socket is fitted within an adjustable box, *d*, which rests upon a lever supported at its further end by a nut and screw, by which means the stones may be made to run at a greater or less distance from each other to vary the fineness of the flour.

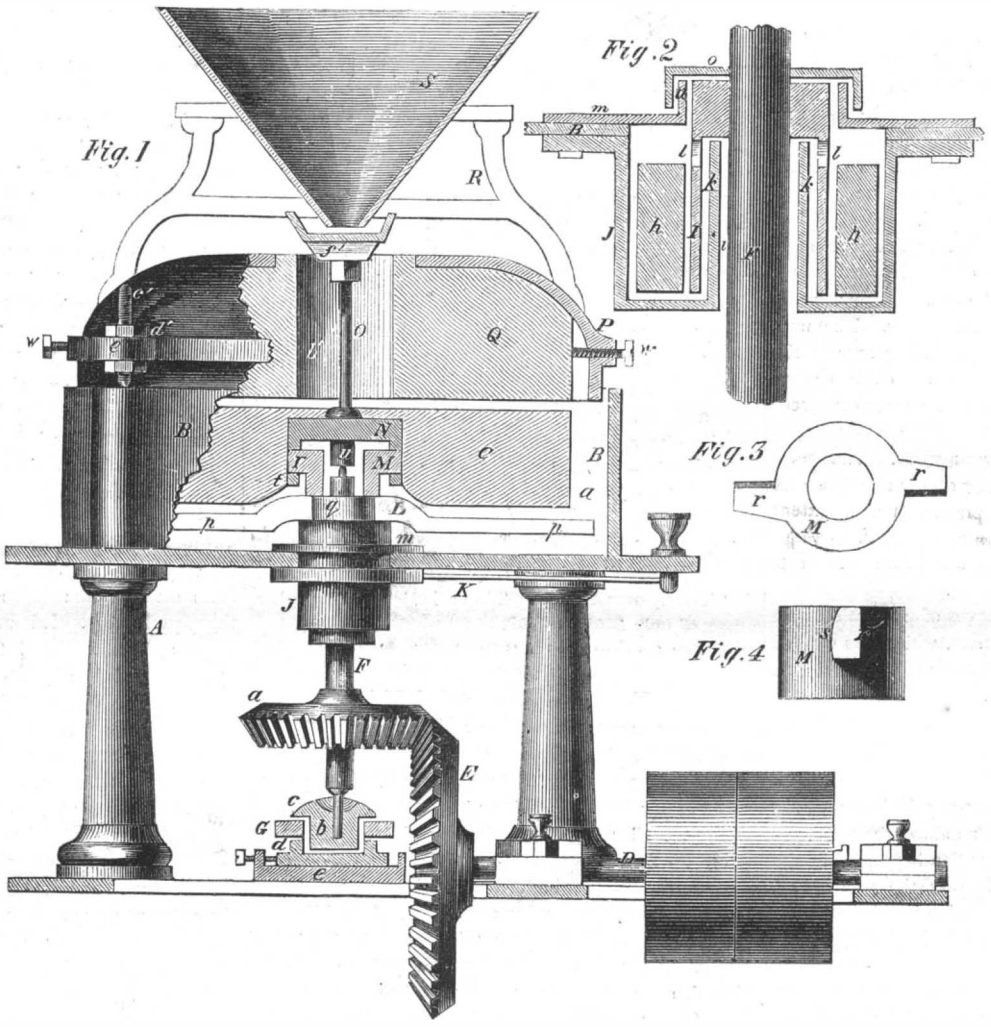
"The spindle, F, is provided with a collar, I, Fig. 2, which is fitted within a box, J, attached to the underside of the shell, B. This box, J, is of cylindrical form, concentric with the shell, and within it there are placed bearings, *h*, which are adjusted snugly against the collar, I, by keys, screws, or other means. The collar, I, is hollow and open at its lower end, having a space, *i*, all around between it and the spindle, as shown at *j*, in Fig. 2. The box, J, is provided with a central vertical tube, *k*, around which the collar, I, works, the tube, *k*, passing up between the collar, I, and the body of the spindle, as shown clearly in Fig. 2. The upper part of the collar, I, is perforated with holes, *l*, which are just above the bearings, *h*, and below the upper end of tube, *k*. K is a tube which extends along underneath the shell, B, and communicates with the upper part of the box, J. This tube, K, is shown clearly in Fig. 1, and it forms a means of supplying the box, J, with oil at any time. The collar, I, within the box, J, forms the bearing surface of the spindle.

"The box, J, is covered within the shell, B, by the cap, *m*, having a circular aperture in its center to allow the spindle to pass through, said aperture having a flanch, *n*, around it, which flanch is covered by a cap, *o*, on the spindle, as shown clearly in Fig. 2. On the upper end of the spindle, F, there is placed a clearer, L. This clearer is formed of two arms, *p p*, attached to an eye, *q*, which is fitted on the spindle and secured thereto by a feather and groove. The arms of the clearer, L, extend nearly to the side of the shell, B.

M represents the driver, which is fitted on the upper part of the spindle, F, and, like the clearer, is secured to the spindle by a feather and groove. The driver, M, rests on the eye, *q*, of the clearer, and the drivers has two arms, *r r*, projecting from its opposite sides, as shown in Fig. 3. The arms, *r r*, are rounded at their face sides or bearing surfaces, the curvature being in a vertical plane, as shown at *s*, in Fig. 4. The arms, *r r*, of the driver fit within recesses, *t t*, of a shell, N, which is secured concentrically within the runner, C, and has a pendant bearing, *u*, which rests upon the apex of the spindle, as shown in Fig. 1. The damsel, O, is attached to the upper surface of the shell, N.

"P is a cast metal cylindrical box, in which the upper stone, Q, is secured by set screws, *w w*. This box is always kept properly lubricated, as oil may be poured into the box, J, at any time, and the oil within the box is retained therein, in consequence of the perforations, *l*, in the upper part of the collar, I. These perforations cause the oil which may have a tendency to rise in the space between the tube, *k*, and collar, I, to pass the holes, *l*, into the box, instead of passing over the top of the tube, *k*, which extends above the holes or perforations, *l*. This is an important feature in this invention, as it effectually prevents the escape of the oil from the box, J, when the latter is not over-supplied."

The patent for this invention was secured to Edmund Munson, through the Scientific American Patent Agency, April 3, 1860, and any further information in relation to it may be obtained by addressing Hart & Munson, manufactures of grinding mills, at Utica, N. Y.



MUNSON'S IMPROVEMENT IN GRINDING MILLS

THE JAPANESE AT THE PATENT OFFICE.

On the morning of the 21st ult., at 10½ o'clock, the Envoy and a suite of about forty left Willard's hotel to visit the Patent Office. On their arrival they were conducted into the office of the Secretary of the Interior, where they were formally introduced to him, also to the Commissioner of Patents. The Commissioner, taking the Envoy, led the way up into the halls above, where they were slowly conducted among the long rows of cases containing models of inventions and relics of the country The case containing the uniform worn by General Washington during the Revolution was pointed out to them; they stood and looked upon those precious relics with the most reverential awe—words could not have expressed their feelings—the sober, thoughtful countenances of these inhabitants of the far-off isles of the sea showed that wherever the name of Washington is known, it is *revered*. The Declaration of Independence and Washington's Commission were pointed out to them, and when they fully understood their import, they made a low *salaam* in token of their reverence for those honored documents. They were interested in the case containing the clothing presented to Minister Harris at Yeddo, and by him forwarded to our government. Their attention was particularly given to the examination of fire-arms and agricultural implements. The stuffed birds interested them very much, and they showed their acuteness by remarking "No smell." Throughout the whole visit they expressed their admiration for everything in the highest terms, and several times asked where all these things were obtained. The Japanese artists took no sketches, but an opportunity of doing so will be afforded them if they wish it. It is believed that their government will publish an illustrated report of the Embassy in this country, in which, probably, many of our best inventions will appear.

The crowd soon became so oppressive as to block up the passages, and it being very warm, the Envoy signified his desire to retire. They then took their leave—expressing their warm thanks to the Commissioner and his *attaches* for the courteous manner in which they had explained everything to them.

M. Thomas, of Paris, has made an improvement in the Bunsen battery to obviate the unpleasant smell arising from the nitric acid in the carbon cell. He causes the gases, as they arise, to pass into a porous vessel, where they are decomposed, and produce a secondary electric current.

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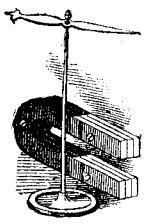
VOL. II., No. 23.....[NEW SERIES.]....*Fifteenth Year.*

NEW YORK, SATURDAY, JUNE 2, 1860.

MAGNETS AND MAGNETIC ATTRACTION.



HERE is much relating to magnets and magnetism that is still veiled in mystery. The power which they possess of attracting bodies to them has led many persons to believe that magnetism and gravity are but different names for the same thing, and that our earth is a huge loadstone. This may be true or it may not; at present we have not accumulated sufficient data to establish such a theory. There are many facts, however, regarding magnetism which are well-known, and these have been so arranged as to constitute a science. One of these facts is, that permanent magnets do not possess power, or as some have named it *coercitive force*, in proportion to their size. Their power depends mostly on the particular kind and temper of the steel of which they are made. Hard steel receives magnetism with difficulty, but retains it most permanently; on the other hand, soft steel is easily magnetized, but parts with its magnetism as freely. At a blood-red heat the magnetic susceptibility of steel is greatest, while a white heatentirely destroys its magnetism.

The distribution of magnetism in steel is superficial; that is, it is mostly contained on or near the surface. A magnet is therefore powerful in proportion to its extent of surface, and one that is hollow has as much *coercitive force*, as a solid one of the same size and form. It is believed that a current of magnetism circulates in each magnet—that a positive current flows out of one pole, like a stream, and passes round into the other; hence an explanation is thus offered why the south pole of one repels the south pole of another, and *vice versa*. Two opposing streams of water meeting together repel one another, and so, it is said, two opposite currents of magnetism must exhibit similar action.

Any piece of hard, close-grained and well-tempered steel can be magnetized by rubbing it in one direction with either an artificial or a natural magnet. There are various other methods of making magnets of steel, but the most remarkable feature of them all is, that they afterwards retain this attractive force. The best method of making powerful magnets is that of Professor Henry, of the Smithsonian Institution. A steel bar is heated to redness, then plunged into a cylindrical vessel kept in cold water, around which a powerful galvanic current is passed through a helix of wire. The intense development of magnetism which takes place in the heated bar, becomes fixed by this operation.

Great care must be exercised to prevent good magnets losing their power. Filing, grinding, polishing with sand paper, or rough treatment of almost any kind is injurious to them. Vibration, the striking of magnets against any object, or allowing them to fall on the ground or to rust, impairs their power. All horse-shoe magnets should have short armatures, and bar magnets should also have their poles thus united, so as to form a rectangle.

A law relating to the amount and sphere of magnetic attraction is, that "the force is as the extent of opposed areas directly, and as the squares of the distance inversely." Thus two magnets of equal area—say one square inch—are of equal power; but this power of attraction is four times greater when they are one tenth than two tenths of an inch apart, according to the experiments of Professor Thomson, and the statements of Sir W. S. Harris in his work on electricity. The experiments which have been made on the force and sphere of magnetic attraction were measured by weight on a scale-beam electrometer, to determine the force, and with tenths of an inch as a unit for the distances apart. The whole of the attractive or magnetic force was supposed to be collected within two opposing points of two metal balls, and situated midway between the center and the circumference. When the distance between the two surfaces of the balls, was .5 of an inch the resistance to separate them was 6 on the scale beam; when they were removed to a distance of one inch apart, the power required to balance the beam was but 2.5; thus proving that the force of attraction was inversely as the square of the distance. When the space between them was increased to two inches, the resistance fell to .75. In estimating the power of a magnet, therefore, according to the distance, we may take the tenth of an inch as a unit already used in experiments, and safely calculate the sphere of attraction and the amount, commencing at this distance from the magnet. This will be sufficient for all practical purposes, and useful as a basis for those who may wish to construct electro-magnetic engines—small or large. A great extent of surfaces and a close proximity of the attractive surface are the main objects to consult in conserving the magnetic power.

STEREOSCOPES FOR AMATEURS—PROCESS OF PRODUCING STEREOSCOPIC PHOTOGRAPHS.

The remarkable success which has attended the introduction of stereoscopes affords a theme for reflection, both in reference to their inherent merit and the influence they are destined to exert in molding the artistic mind of our nation. The warm reception given to them shows the existence of an innate sense of *the beautiful* in the minds of our citizens, which needs but the time and the occasion to develop itself into a true artistic judgment. The imputation that Americans are a people entirely devoted to providing for the practical necessities of life—educating their children to be sharp, narrow and shrewd, rather than broad, genial, philosophical and appreciating—is rapidly giving place to respect for a people whose history has shown them practical when their physical wants demanded it, but devoted to the finer arts when their means afford them the time necessary to devote to such studies. We have only to look at the manufactured articles of merchandise, daily offered for sale in our stores, to discover this innate appreciation of *the beautiful* in our people. A mere machine, in order to sell in the American market, must not only be effective but it must be well proportioned and arranged with an eye to please. Our sailing vessels, so far as beauty of construction is concerned, are certainly good specimens of mechanical art. The vessels that line our wharfs would hardly be recognized as the descendants of the broad-bottomed crafts that floated the Dutch founders of this city from the old Amsterdam to *New* Amsterdam. Good Governor Wouter Van Twiller could scarce set himself down upon the narrow deck of one of our modern clippers; and in this narrowness of vessels we have not only gained utility of speed, but beauty of construction. We, therefore, think that we have some reason for believing that there has been a new element engrafted in the constitution of our people, resulting from their emigration to this new world, and which we can only explain by attributing it to the peculiar features of our social and political institutions.

The stereoscope is one of the means destined to advance our national taste for art. It affords amusement and instruction to children and pleasure to old age. Its cost is so little that we can calculate on its penetrating the homes of the humblest men, who, with but very little money and time, can themselves take the pictures, and thus keep a new and varied stock of photographs. With a pile of pictures by their side, which cost almost nothing, they can make the European tour of celebrated places, and not leave the warm precincts of their own firesides. Such views are generally photographed upon paper and seen in the stereoscope by reflected light. The process of photographing for stereoscopes is somewhat intereresting, and we will therefore give a brief description of it.

Strictly speaking, photography is an artistic application of chemistry; and the photographer soon becomes—to a greater or less extent—a practical chemist. Nitrate of silver is the first chemical which comes under his notice, and it is the most important of all the compounds which he uses. A strong solution of this salt, brushed over a piece of white paper and dried in the dark, assumes, when exposed to sunlight, a gray, and finally a brown color; and if any opaque substance be placed on a part of the paper during the time of exposure, it will be observed that such part being protected from the action of the light, a photographic outline copy of the opaque substance will be obtained. The principle involved in this fact—the reduction or decomposition of the nitrate of silver—regulates and determines the action of nearly all the various photographic processes. Thus, in the collodion process, a fine kind of trsnsparent paper is formed on a plate of glass, by pouring upon it an ethereal solution of gun-cotton and iodine; the ether evaporates and leaves a thin film on the glass, which is plunged into a vessel containing a solution of nitrate of silver; the nitrate immediately produces a surface similar to, but more sensitive than that of the prepared paper first spoken-of. The sensitive film, still adhering to the glass plate, is then placed in the focus of a camera obscura, and an image or shadow of some object thrown on its surface. The light reflected from this object rapidly causes a surprising but invisible change—the image in the camera has impressed itself on the sensitive surface of the collodion film, but the impression, being latent, requires development, and this is effected by pouring a chemical solution over the surface of the impressed film; the image very soon makes its appearance, and only requires to be "fixed" or secured from the further action of the light, when the photograph is finished.

A picture produced as above stated, when held over a dark object and seen in the ordinary manner by reflected light, has its lights and shadows properly disposed, and is a perfect copy, except in color, of the image formed in the camera obscura; but when viewed as a transparency, the lights and shadows are reversed. Supposing a portrait of a gentleman to be taken, the collodion photograph, seen by reflected light, would show a white shirt-front and a black coat, this would be a positive photograph; but the same glass held up to transmitted light would present the appearance of a black or opaque shirt-front and a white or transparent coat, this would be a "negative." In practice it is found that the best negative by transmitted light makes the worst by reflected light, and *vice versa*.

If the picture is intended for a positive, black varnish or velvet is placed on the back of the glass, and its slight negative character is destroyed; on the other hand, if the picture be negative, its value lies not in itself, but in its power of producing an unlimited number of positives on paper, by a process called "printing." This paper is prepared in the dark with chloride and nitrate of silver, made exceedingly sensitive to the action of light; and when dry, the negative is placed on a sheet of this paper, fixed in a glazed frame, and then exposed to daylight. The rays, passing easily through the most transparent parts of the negative, blacken those portions of the paper immediately under them, and form the shades of the photograph, while the lights are preserved by the opaque parts of the negative. When properly printed, the paper photograph is taken from the printing frame and fixed by removing the unaltered and now unnecessary chemicals from the surface of the paper. The process can be repeated *ad infinitum* on other papers with the same negative. For pictures to be used in Sir David Brewster's lenticular stereoscope, it is necessary to have a pair of pictures identical in subject, and differing only in one respect—the visual angle. One of them should faithfully represent the object as seen with the right eye, and the other the same object as seen with the left eye. The optical arrangement of the stereoscope combines these two one-eyed views, and gives the marvelous effect of a perfectly solid reproduction of the original—a single picture of the object as viewed with both eyes at once.

A RAILROAD IN A COURT-ROOM.—On the morning of the 21st ult., the Supreme Court-room (this city) was crowded with various counsels representing the 325 defendants in the suit of the New Haven Railroad Company *vs.* Robert Schuyler *et al.* Mr. Daniel Lord opened for the defense and called witnesses. It is understood that the other counsel will proceed in the alphabetical order of their names. A large amount of testimony is to be offered, and it is probable that the case will not be closed in several weeks. It has reference to the over-issue of a very large amount of stock (amounting $1,700,000) by Robert Schuyler, while he held the office of president of the above company.

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WEEKLY SUMMARY OF INVENTIONS

The following inventions are among the most useful improvements patented this week. For the claims to these inventions the reader is referred to the official list on another page:—

GUN STOCKS.

This invention consists in a certain construction of the stocks of fire-arms intended to be fired from the shoulder, whereby a firmer grasp is obtained for the right hand in firing, and the piece is enabled to be held more steadily against the shoulder, and with the elbow depressed so as to be more out of the reach of an enemy's fire than with the ordinary construction, and whereby provision is made for constructing the stock in two parts which may be disconnected for more convenient carriage and for the conversion of a piece from a gun into a pistol, and *vice versa*. The credit of this contrivance is due to Charles R. Alsop, of Middletown, Conn.

PUMPS.

This invention consists in furnishing a reciprocating pump with an intermediate cylinder, fitted to work easily but closely between an inner stationary cylinder in which the piston or plunger of the pump works, and an outer cylinder which is in communication with the suction and discharge chamber; the said cylinders having such a system of ports that the intermediate cylinder, by having a proper reciprocating motion imparted to it, is made to serve the purpose of both inlet and discharge valves, and control the admission of the water to and its discharge from the pump in a more perfect manner than can be done by the valves ordinarly used. The inventor of this improvement to George H. Mills, of East Boston, Mass.

FORE-AND-AFT SAILS.

The object of this invention is to simplify and lighten the fore-and-aft rig still further than is done by improvements patented by the same inventor in the year 1856, and at the same time to obviate the necessity of furling aloft; and to this end the invention consists in dispensing entirely with the top-sail, by the use of a main-sail of triangular form attached to the boom in the usual manner, and applied in combination with two halyards, arranged in such a way as to make it serve both as main-sail and top-sail. This improvement was designed by George W. Gerau, of Brooklyn, N. Y.

HANGING TOP-SAIL YARDS.

In ships with divided top-sails it has been heretofore customary to attach the lower top-sail yard either to the top-mast or to the cap of the lower mast, in the latter case subjecting the cap to a great and often injurious strain, and in the former case bringing a great extra weight on the trestle-trees, which are thereby rendered very liable to sink down in front. The object of this invention is to relieve the top-mast trestle-trees entirely, and the cap of the lower mast in a great degree of the weight of the yard, and to relieve the cap as much as practicable of the strain of the lower top-sail; and to this end, this invention consists in supporting the yard partly by a metal strap attached to the head of the lower mast at a short distance below the cap, and in the employment of an obliquely arranged iron brace applied in a novel manner in combination with the yard and the before-mentioned strap, and with a bolt which passes through the cap and the strap for the yard to swing upon. This device has been patented to James Nute, of East Boston, Mass.

GRAIN-BINDER.

This invention consists in the employment of a rotating arm, stationary gavel-receiving box, twisting device, cutter and holder, and fingers or teeth, whereby the gavel may be bound, and the binding wire twisted, cut and secured in proper position for the succeeding operation; all the parts working automatically by the turning of a single shaft, and a gavel bound at each revolution of said shaft. The patentee of this invention is D. W. Ayres, sf Middleport, Ill.

CARPET-CLEANER.

The object of this invention is to combine with vibrating, beating or whipping arms, stiff or elastic, a brush or broom cylinder and fans for beating, brushing or blowing-off the dust from carpets all at one and the same operation, and for brushing both sides of the carpet in its passage through the machine. The several parts that are combined to effect this object, viz.: the perfect cleaning of carpets, are exceedingly simple and compact, and not attended with any manual labor more than carrying the carpet to the machine and removing it therefrom when cleaned. This machine will prove a great relief to housekeepers, especially in large and crowded cities, where the places for thoroughly cleaning a carpet are scarce; and, besides this, the cleaning by the machine is much more perfect, and it is attended with less injury to the fabric than the ordinary method of cleaning carpets by beating them with sticks in the open air. Henry L. Nichols, of No. 135 Troy-street, this city, is the inventor.

BRUSH.

This invention relates to an improvement in that class of brushes which are used for washing or for scrubbing, and its object is to provide a means for attaching cakes of soap to their backs, so that the soap and the brush will be combined with one handle, and that the soap can be used without grasping it by the fingers, with greater freedom and ease than in the present way. The invention consists in attaching to the back of a brush a plate or plates of metal or other suitable material, by means of rivets, or made to form a part of the back of the brush, the edges of which plate are turned up and over to form a curved or angular groove, into which the soap is pressed and held perfectly secure during the operation of washing or scrubbing. It is particularly applicable to such brushes as are used for washing the hands or other parts of the body, but it can also be applied to brushes used for washing clothes or for scrubbing. The credit of this exceedingly simple and ingenious invention is due to Wm. Tusch, of Brooklyn, N. Y.

CURING PRUNES.

Prunes, like raisins and other similar dried fruits, when they have been exposed to the influence of a moist atmosphere for some time, become covered with a white or grayish film, resembling mold. In this state, the prunes are not saleable, and a large quantity of this valuable fruit is spoiled or sold at half-price, because fruit-dealers have heretofore had no means to remove said film and restore the prunes to their original appearance and freshness. By this invention, the object of restoring the prunes has been accomplished to perfection, and the largest quantity of this fruit can now be cured in a very short time, simply by exposing the prunes for a few minutes to a current of steam. The inventor of this method is Isaac Reckhow, of Brooklyn, N. Y., who has assigned it to John Griffith, of the same place, and the assignee has put it into practice with complete success.

POWER PRESS.

The object of this invention is to obtain a progressive power press by which the power may be applied in a manner commensurate with, or in the same ratio as, the increasing resistance of the article under compression. The invention consists in the employment of toggles applied to the press in such a way as to admit of repeated applications of power, near the termination of their movement, and thereby effect the desired end, so far as the application of power is concerned. The invention also consists in a novel means employed for applying the power to the toggles, whereby the manual operation of the press is greatly facilitated. The patentee is James Weed, of Muscatine, Iowa.

MOLDS FOR DENTISTS' DIES.

The object of this invention is to enable one of the two metal dies used by dentists, in forming their plates, to be cast in the impression that is taken from the mouth, thereby simplifying the process of obtaining the first die, and enabling a perfectly-fitting plate to be obtained, without the failure which is so common with dies obtained in the usual way; and to this end, the invention consists in an improved construction of the impression cup, in a new composition for taking the impression (which is also used as a portion of the mold), and in a new system of flasks employed in combination with such cup and composition; the whole constituting a complete mold. These improvements are the invention of F. Y. Clark, of Savannah, Ga.

BREECH-LOADING FIRE-ARM.

These improvements are more especially designed for pocket pistols, but are also applicable to other fire-arms. The first improvement consists in a certain mode of combining the barrel with the stock or breech frame, whereby provision is made for moving the barrel, or a portion thereof, downward to a position at right angles, or thereabout, to the position in which the firing is effected, for convenience of carrying the weapon in the pocket, or of packing it away in a small space, and for locking it in either position. A second improvement consists in combining the downwardly-movable barrel, or a portion thereof, with a cocking and firing trigger or lever, in such a manner that it is rendered impossible to effect the discharge while the barrel is secured in its downward position. A. J. Gibson, of Worcester, Mass., is the inventor.

AN IMPORTANT PATENT CASE.

Baldwin vs. Lamar.—This case has been on trial in the United States Circuit Court since the 23d ult., now over three weeks. As the case was before reported by the *Courier*, our readers will remember that it was transferred from Savannah to Charleston, in consequence of some relationship between one of the parties in the suit and the judge before whom the case was to be tried in Georgia. The suit is brought for a violation of the Letters Patent to Philos B. Tyler, for improvements in cotton presses. The plaintiff is assignee under the patent for the city of Savannah, and for 20 miles around the city. Able counsel on both sides have been engaged. George Gifford Esq., a distinguished jurist from New York, and over 25 years' experience in patent cases, together with Messrs. Petigru and King, are employed for the defendant, and Messrs. Norwood and Wilson, of Savannah, for the plaintiff. Mr. Gifford on Monday commenced the closing argument for the defendant, and spoke up to the hour of adjournment. His argument was a masterly exposition of the Patent Laws of the United States, with their various relations to the interests of the inventor and the public. We regret that want of space prevents us from noticing more fully the several points touched upon by both counsels—*Charleston Courier*.

[We have since ascertained that the decision of the court was given in favor of the plaintiff.—EDS.

APPLICATION FOR THE EXTENSION OF A PATENT.

Wood Screws.—Thomas J. Sloan (assignor to the Eagle Screw Company, of Providence, R. I.,) has applied for the extension of a patent granted to him on the 20th of August, 1846, for an improvement in the above-named class of inventions. The testimony will close on the 24th of July next, and the petition will be heard at the Patent Office on the 6th of August.

A TREMENDOUS TORNADO.—On the 21st ult., a most violent tornado visited the valley of the Ohio, and so disastrous and sad have been its effects that no less than 100 lives are reported to have been lost, and about $1,000,000 worth of property destroyed. It extended from Louisville to Marietta, and followed the course of the Ohio river. It came from the northwest in the form of a dense black whirling cloud about a mile in breadth, and rushed on with an awful velocity, sinking boats on the water, and prostrating many houses in Louisville, Cincinnati and other places. It was the most destructive wind storm that has ever visited any section of this country, as far as we recollect.

THE GOLDEN STATE.—From tables published in the San Francisco *Mercantile Gazette*, it seems that the treasure received at San Francisco from the northern mines during the first quarter of 1860, amounted to $8,144,865, and from the southern mines, $2,688,364. Total, $10,833,229. The export of treasure for the same three months was $10,122,794. The amount of treasure received from all the mines was greater than during the same months of 1859, by $1,215,491.

THE present volume of the SCIENTIFIC AMERICAN will close in three weeks from this date, and we hope those of our subscribers whose terms expire with this volume will be prompt in remitting their subscriptions for the next one; not only this, but that they will exert themselves to form a club, and thus avail themselves of our liberal clubbing rates.

NEW BOOKS AND PERIODICALS RECEIVED

DENTAL ANOMALIES, and their Influence upon the Production of Diseases of the Maxillary Bones. By A. M. Forget, M.D., C.L.D., &c. Memoir crowned by the Academy of Sciences, at its meeting of March 14, 1859. Translated from the French. Published by Jones & White, Philadelphia.

This treatise, with the six plates of illustrations neatly reproduced is sent free of postage on the receipt of 40 cents in stamps by the publishers.

PATENT OFFICE AND PATENT LAWS, or a Guide to Inventors and a Book of Reference for Judges, Lawyers, Magistrates and others; with appendices. By J. G. Moore. Henry C. Baird, publisher, No. 406 Walnut-street, Philadelphia.

This is the title of a new edition of a most useful work for patentees and inventors. It contains the United States law of patents, with the forms adopted by the Patent Office; also a summary of judicial opinions in regard to patent cases. It also furnishes what purports to be a synopsis of European patent law, which is unreliable and incorrect. The compiler of this work appears to have been ignorant of the fact that, in 1852, the British patent system was essentially changed, and the fees considerably reduced. If he had been aware of this fact—and it is one upon which he had no business to be ignorant—he would have saved himself the trouble of an attack upon England for outraging Ireland in the matter of granting patents. The book contains 342 pages, and is sent postpaid by the publisher for $1. Mr. Baird is an honorable publisher, and money may be safely remitted to him.

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INDUSTRY—MANUFACTURES—COMMERCE.

A Fact for Firemen.—The Common Council of New York have appropriated $30,000 for steam fire-engines.

Ventilating Porous Hats.—We have frequently directed attention to the superiority of silk hats, so formed as to provide for complete ventilation of the head; and, on page 102 of our last volume, we described a unique hat of this character, made by a peculiar machine patented by W. F. Warburton, of Philadelphia, Pa. These hats have just been introduced into this city by John N. Genin, the well-known hatter of Broadway, who has made arrangements with the patentee to make and sell them; each hat is pierced in its sides with 1,000 minute but unseen perforations.

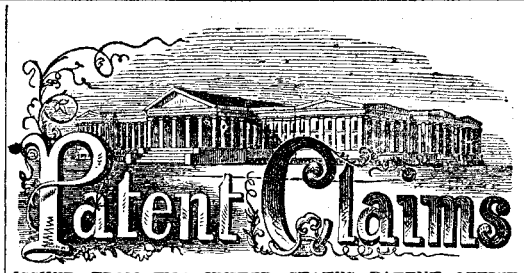
A Good Time Coming.—The Staunton (Va.) *Spectator* says:—"The universal testimony of our farmers is that the wheat crop of this county never promised a better yield at this season of the year." The same cheering news comes to us from the western States and Canada.

American Butter in Europe.—The most striking feature of the past week has been the English demand for new butter, 300 tubs of yellow State dairy having been sold at 18c. a 20c. to go to Europe, and as much, if not more, will be shipped this week. This, with the demand for Southern orders, creates a scarcity and quick sale for yellow butter. White butter and tubs with white bottoms are plenty, and sell slowly at 13c. a 16c. Ohio butter is daily growing more plenty and the quality improving, and finds a ready sale at 16c. a 18c. per lb.: while Orange county butter ranges from 18c. to 22c.

Philadelphia and Water Gas.—Quite a controversy is going on in the Philadelphia papers between Messrs. H. C. Carey, Marmaduke Moore and A. Hart, as a committee in favor of Sanders' water gas, and J. C. Cresson, chief-engineer of the Philadelphia Gas-works, on the opposite side. The committee quote Professor Mapes' report to show the cost of making water gas to be 37 cents per 1,000 cubic feet; while that of coal gas is $1.20 per 1,000 cubic feet. Mr. Cresson asserts that the report is not reliable, and that the prime cost of the water gas is $1.44 per 1,000 feet, or 20 per cent more than coal gas. The committee invite a fair investigation, being confident that the water gas is the cheapest. The materials and the real essential parts of the process for making this water gas are old, and have been tested on former occasions.

Kerosene Oil-works.—The old and well-known Kerosene Oil-works situated on Newton creek, Long Island, were sold under the auctioneer's hammer on May 10th, and everything went off at very low figures, in comparison with their original cost. Peter Cooper bought the entire works and stationary fixtures for $96,000, the original cost of which was $302,000. There were 35,373 gallons of heavy oil (mostly solid paraffine) sold for 23½c. per gallon, and 9,000 gallons of crude oil sold for 8¼c. per gallon. The thick paraffine oil was a bargain. The purchaser can clear about $2 per gallon by converting it into candles. It is stated that a vast useless expenditure had been incurred in the erection of these works (for machinery and apparatus), and that they could not be carried on profitably on this account. Most of the coal oil-works in this section have been carried on under disadvantages. Scarcely any of them has been able to do more than pay expenses, while quite a number have broken down. The coal for making the oil is too dear, in the first place. That which the Kerosene Works had been using was the Scotch Torbane-hill cannel, and cost $15 per tun. The expense for the carriage of cannel coal from the West to manufacture coal oil in New York is too great. The entire distillations and the refining processes can be conducted most economically at the coal mines. Several coal oil-works in Brooklyn obtain the crude oil from Virginia and Ohio, and simply refine it for sale; they are wise.

Michigan Manufactures.—The Detroit *Tribune* has a full statement of the manufacturing establishments of Michigan, and their valuation. The sum total of the capital invested is $13,433,930. The largest interest is sawmills 1,226 in number, valued at $4,435,200; 417 flouring mills, $2,874,700; 5 railroad repair shops, $584,000; 103 foundries, $568,000; 34 breweries, $589,500; 58 tanneries, $372,800; 17 machine-shops, $326,000; 3 iron-rolling mills, $229,000; 42 furniture factories, $195,000; 2 railroad car factories, $175,000; 27 woolen factories, $153,700; 1 locomotive factory, $150,000; 4 blast furnaces, $135,000.



ISSUED FROM THE UNITED STATES PATENT OFFICE
FOR THE WEEK ENDING MAY 22, 1860.

[Reported Officially for the SCIENTIFIC AMERICAN.]

*** Pamphlets giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

28,337.—Calvin Adams, of Pittsburg, Pa., for an Improvement in Clevis for Plows:

I claim, first, Constructing the loose end-piece of the clevis with hooked ends fitting into suitable slots in the shanks, for the purpose of forming a connection between the outer extremities of the shanks and at the same time sustaining the end piece in its proper position without any bolt or other fastening for that purpose.

Second, Combining with a plow clevis, constructed as described, a projection or lug on one of the shanks, in the manner and for the purpose set forth.

28,338.—Daniel W. Ayres, of Middleport, Ill., for an Improvement in Grain Binding Machines:

I claim the employment or use of the rotating arm, G, with the toothed segment, E, and rod or bar, F, attached in connection with the stationary box G, and twister, formed of the stationary and movable heads, k l, and the holder and cutter formed of the lever, K, provided with cutting and holding teeth, p and q, all being arranged for joint operation, substantially as and for the purpose set forth.

28,339.—G. L. Bailey, of Portland, Me., for a Ballot-box:

I claim, first, The employment of dials, O and P, with their numerals and blank space, operating in conjunction substantially as and for the purpose set forth.

Second, The employment of dials, O and P, as and for the purpose set forth, in combination with ratchet wheel, L, pawl, A and pull, E, or their equivalents.

Third, The combination and use of the above claimed dials, ratchet wheel, pawl and pull, operating as described, with alarm bell, c, for the purpose set forth.

Fourth, The combination and use of the above claimed dials, ratchet wheel, pawl and pull, whether with or without alarm bell, c, with any suitable box, substantially as described.

Fifth, The combination and use of an alarm bell, with a self-registering ballot-box.

Sixth, The combination and use of two sets of registering mechanism, with one ballot box, operating substantially as and for the purpose set forth.

28,340.—H. O. Baker and James McGill, of New York City, for a Fire-escape:

We claim the stairs or ladders, the folding guard, or their equivalent, in connection with balconies upon the outside of a building, substantially as described, for the purpose specified.

28,341.—J. F. Bennett, of Pittsburg, Pa., for an Improvement in Apparatus for Condensing Coal Oils:

I claim subjecting the volatile products of the distillation of coal (composed of a mixture of various substances in the form of vapor), directly as it passes from the retort or prime generator, to gradually diminishing degrees of heat, in a succession of condensers, for the purpose of separating by one operation, each of these several different substances from the other substances with which it is mixed when in the form of vapor, at the particular degree of temperature at which it assumes the liquid form, as distinguished from the fluid or gaseous form, by means of an apparatus, such as described, when combined with a coal oil retort.

28,242.—G. W. Billings, and W. M. Hutton, of Cleveland, Ohio, for an Improved Apparatus for Elevating Water from Wells:

We claim the arrangement of the disks, F F', with the radial slots, G and revolving wedge, E, in combination with the radial arms or lugs, H, shaft, B, and rope, D, the whole being constructed, substantially as set forth, for the purpose described.

We also claim the sliding draws, P P', hooks, N N', and loops, M M', when specially arranged as described, and operating conjointly in combination with a windlass and buckets, in the manner and for the purpose set forth.

28,343.—J. H. Bonham, of Elizabethtown, Ohio, for an Improvement in Corn Planters:

I claim the seed reservoir, C, in combination with the hopper B, operated by the driving wheel, E, in the manner and for the purpose set forth.

I also claim the combination of the pivoted hopper, B, perforated flange, m, hook, r, brush, h, and ring, k, constructed, arranged and operating substantially as and for the purpose set forth.

28,344.—John Broughton, of New York City, for an Improvement in Dress for Millstones:

I claim the employment or use of the peculiar zig-zag form of teeth, so cut or constructed on the grinding surfaces that while the working edges or meal-producing line shall present an obstruction to the discharge of unground portions of the substances passing through the mill, the furrows shall be clear and unobstructed, for the free passage of air, and the proper ventilation of the grinding surfaces, substantially as set forth.

[This invention relates to an improvement in that class of grinding surfaces for mills in which the teeth are cut or so constructed as to pass or cross each other at an angle and cut with a shearing action.]

28,345.—C. W. Brown, of Boston, Mass., for an Improvement in Rotary Cutting Shears:

I claim the annular shear plates, when formed and arranged essentially as and for the purposes described, so that their cutting edges will always be kept in perfect contact, and so as by their elasticity, to correct any variations in their thickness, resulting from imperfect workmanship, or other causes.

[This invention has for its object the cutting or shearing of india-rubber cloth into narrow strips by a new and improved system of rotary shears, which are constructed and arranged upon suitable shafts, in such a manner that they will be brought into contact only at their cutting edges, or so that the points of contact of the shears will be the cutting points.]

28,346.—Wm. R. Carnes, of Roxbury, Mass., for an Improved Flush Bolt:

I claim the above described flush bolt, or door fastening, consisting of a single spring bolt flush with the edge of the door or jamb which is locked by the edge of the other door, as set forth.

28,347.—Alfred Carson, of New York City, for an Improved Fire-place:

I claim the arrangement of the inclined grate, I, fireplace, C, feeder G, hearth plate, H, and cold air passage, j, with or without the air-heating passage, E, substantially as and for the purpose set forth.

[The object of this invention is to obviate the difficulty hitherto attending open grates or fireplaces for heating apartments, namely, the escape of a large amount of heat up the chimney or flue, the result being due to the encompassing of the back and sides of the fire-place or grate by the masonry of the chimney, and the consequent small area of heat-radiating surface exposed, together with the very direct communication of the fire with the chimney or flue.]

28,348.—F. Y. Clark, of Savannah, Ga., for an Improvement in Molds for Metal Dies used by Dentists:

I claim, first, The impression cup, perforated, substantially as described, for the purposes specified.

Second, The combination of the perforated cup, C, the impression obtained directly from the mouth, and the two flasks, A and B B, constructed substantially as described, the whole constituting a mold for casting the die, of which the impression taken directly from the mouth forms a part, as specified.

28,349.—A. C. Clemens, of Crain Township, Ohio, for an Improvement in Apparatus for Evaporating Saccharine Juices:

I claim the construction and arrangement of the several fire chambers and the two smoke-pipes with the damper, I, in combination with the peculiar arrangement of the pan in different divisions, at variable hights, substantially as set forth for the purposes described.

28,350.—J. H. Clifton, of New Castle, Pa., for an Improvement in Bands for Machinery:

I claim a band, the warps of which are of animal fiber, and the wefts of either animal or vegetable fiber, impregnated or coated with pliable cement.

28,351.—L. O. Colvin, of Cincinnatus, N. Y., for an Improvement in Cow-milkers:

I claim, first, The arrangement of the adjustable elastic tube, D, between the tubes, E C, as and for the purpose shown and described.

Second, The attaching of the tubes, C, of the teat tubes to the pump cylinder, b, by means of the balls, q, sockets, p, and elastic tubes, r, for the purpose set forth.

Third, The employment, in combination with the milk pail, of a pump provided with double pistons and double brakes, or lever, that move in opposite directions, so that the force required to move one of the brakes and pistons in one direction will be counterbalanced or equalized by the force applied to move the opposite piston and brake, thus preventing the pail and apparatus from being capsized or displaced by the act of pumping, and also producing a quick vacuum within the pump, all as shown and described.

[This invention consists in combining a single-acting pump with a series of teat tubes and a milk receptacle, whereby the device may be readily manipulated and applied to the animal, and the action of the teat tubes on the teats made to resemble the natural draw or suction of the calf. The invention also consists in a peculiar construction of the teat-tubes, pump, and valve, whereby the apparatus or device is rendered capable of being perfectly cleansed with facility.]

28,351.—Wm. Compton, of New York City, for a Pianoforte Action:

I claim, first, The repeating finger, k, when placed diagonally to the fly of the jack, and taking the butt, g, of the hammer beneath the center on which said hammer moves, for the purposes and as specified.

Second, I claim the twining-pin 8, combined with the spring in the jack of a piano, for regulating the power of such spring, as specified.

Third, I claim the regulating stop screw, 5, to adjust the elastic material that takes the side of the fly-jack, c, for the purposes set forth.

Fourth, I claim the regulating button, 4, only when formed on and adjusted by a screw that passes through the base of the jack-fly, c, whereby the said button is drawn out with the key, and is not in the way of the check, l, in removing the key, as specified.

Fifth, I claim controlling the action of the repeating parts of pianoforte actions, by means of the hammer rail, e, that takes said parts, and determines their position relatively with the hammer itself, as set forth.

28,353.—G. W. Davis, of Brooklyn, N. Y., for an Improved Arrangement of Counter Shaft:

I claim, first, The yielding counter shaft, or intermediate shaft, D, suspended upon and attached to the carriage, as described, and in relation to the shafts, B and C, as set forth.

Second, The lever, S, in combination with the gate, F, and the weight, P, substantially as and for the purpose specified.

28,359.—G. W. Davis, of New Orleans, La., for an Improvement in Ice Cream Freezers:

I claim the vessel, P, pump, V, pipes, X and S, in combination with cylinder, b, when arranged and operated as or substantially as and for the purpose set forth.

28,355.—A. E. Doty, of North Henderson, Ill., for an Improvement in Seeding Machines:

I claim the arrangement of the double-acting plates, H, openings, h, boards, i, slide bars, E, boxes, D, levers, F, rollers, B, and scrapers I, all as and for the purpose shown and described.

[This invention relates, firstly, to an improved seed distributing apparatus, by which the proper and even distribution of seed is insured, and the device made to work properly as long as any seed remains in the seed boxes. The invention relates, secondly, to a combined coulter and furrow share, and also to scrapers for the purpose of depositing the seed in the earth, and covering the seed in a proper manner.]

28,356.—Carolus Dunham, of Batavia, N. Y., for an Improvement in Potato-Diggers:

I claim the rake, 6, operated as described, the plane, 18, spring inclined plane, 14, in combination with the plow and plow box, having closed sides and open bottom, substantially as described and for the purpose set forth above.

28,357.—David Eldred, of Monmouth, Ill., for an Improvement in Seeding Machines:

I claim the employment or use of the tubes or seed receptacles, a, when attached to the peripheries of the wheels, E, and provided with adjustable yielding or elastic stoppers, b, arranged as and for the purposes set forth.

I also claim the adjustable or hinged scattering board, F, attached to the seed box, C, as and for the purpose specified.

I further claim the double inclined partitions, c c, in the seed box, C, arranged relatively with the seed-distributing wheels, E, for the purpose set forth.

[This invention relates to an improved seeding machine of that class which are used for sowing seed broadcast, and consists in a novel means for varying the capacity of the seed receptacles; and, consequently, for regulating the amount of seed to be sown on a given area. The invention also consists in the use of an adjustable scattering board attached to the seed box, and so arranged relatively therewith, that the distribution of the seed may be stopped whenever desired, without throwing the working parts of the distributing device out of gear with the driving wheel. The invention further consists in a means employed for retaining the seed in proper position within the seed box, so that the distribution of the seed will not be affected by the inclination of the machine in moving over inclined ground.]

28,358.—Walter Fitzgerald, of Boston, Mass., for an Improved Pegging-machine Jack:

I claim the combination and arrangement, in a pegging machine, of the friction feed rolls, j and d, with the plate, o, which carries the shoe, and the guide gage, q; all operating together, substantially as set forth.

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28,359.—A. A. Garver, of Mechanicsburgh, Pa., for an Improvement in Digging Machines:

I claim, first, The combination, with the cylinder, 5, of the spades, 6, so arranged, in connection with the other parts, as to have a torsional vibration, as described, for the purposes set forth.

Second, The combination of the cylinder, 5, and the torsionally-vibrating spades, 6, with the traction wheels, 11 and 12, or one of them, by means of detachable gearing, substantially as and for the purposes stated.

28,360.—G. W. Gerau, of Brooklyn, N. Y., for an Improvement in Mainsails of Fore-and-aft Vessels:

I claim the combination, with the lower mast and topmast, of the sail, A, and halyards, E F, as and for the purpose shown and described.

28,361.—John Gilmore, of New Orleans, La., for an Improvement in Machines for Cleaning Cotton:

I claim the arrangement and combination of the feed box, H, and slide, G, between the picker, B, and the compartment, b, as and for the purpose shown and described.

I also claim the combination of the chute, m*, with the slotted bottomed spout, I, as and for the purpose shown and described.

[The object of this invention is to obtain a simple and efficient machine for opening and cleaning cotton, wool and similar fibrous substances, preparatory to the spinning of the same. The invention consists in the use of a rotating picker placed within a suitable shell, a portion of which is perforated, in connection with a fan, dust chambers, stationary picker teeth and discharge spouts, whereby the desired object may be obtained.]

28,362.—J. H. Glover, of Glasgow, Ky., for an Improvement in Hanging Millstones:

I claim the employment of the adjustable conical shell, E, when arranged and constructed as shown, in combination with the stones, A B, as and for the purposes set forth and described.

[This invention consists in the employment of a conical shell placed on the spindle, and directly over its bush, and so arranged as to serve as a shield or protector to the bush, and also as a driver and balance iron for the runner or upper stone. The invention also consists in the peculiar arrangement of the bush and shield, whereby the proper lubrication of the spindle is insured, as well as the ventilation of the stones.]

28,363.—J. F. Hall, of Bangor, Maine, for an Improved Curtain Fixture:

I claim the spring bracket, E, substantially as described, for the purposes set forth.

28,364.—Samuel Hall, of Boston, Mass., for an Improved Attachment of Yards to Topmasts:

I claim attaching the yard to the topmast by means of the swiveling shaft, b, the axis of which passes through the yard, and both the standard, e, and brace, g, of the swinging crane, in the position and manner substantially as described.

28,365.—Asa Hapgood, of Worcester, Mass., for an Improved Ventilator for Railroad Cars:

I claim the described ventilator, consisting of the box, A, hood, B, wheel, D, and water box, C, arranged and operating in the manner described for the purpose specified.

28,366.—Wm. H. Harn, of Carlisle, Pa., for an Improvement in Preserve Cans:

I claim, in disks for closing the openings in preserve jars or cans, or other vessels, making the inside disk in two parts or pieces, substantially as described, so that it may be readily passed into or through the opening to be closed.

28,367.—Abiel Hayes and James Vancuren, of Chenoa, Ill., for an Improvement in Corn Planters:

We claim the arrangement of the slides, D D, provided with cutters, a a, with seed openings, d, in their rear, and with coverers, H H, when the same are used in connection with the frame, A, seed boxes, J J, seed slide, e, treadle, F, and lever, I, substantially in the manner and for the purpose specified.

28,368.—Elijah Harris, of Princeton, Ill., for an Improvement in Spade Plows:

I claim the arrangement of the cylinder, J, in combination with spades, K' K', pivots, L L, pinions, M M, master or driving wheels, D D, arms, G G, slotted guide, N, scrapers, O O, and rod, P, with a cord attached to it, substantially as shown and described.

28,369.—Wm. H. Henderson, of Franklin, Ind., for an Improved Machine for Making Rain Troughs:

I claim, first, The employment of the box, A, and the curved metallic braces and supporters, B B, when the same are used substantially as and for the purpose specified.

Second, In connection with the box, A, the employment of the levers, C C C, screws, d d d, and nuts, E E E, when the same are used for holding the gutter in proper position for soldering the joints and braces in the gutter, substantially as set forth.

28,370.—M. A. Howell, Jr., of Ottawa, Ill., for Safety Paper:

I claim the application of metal, in foil or in powder, between the laminæ of thin paper, to designate the character or denomination of each particular bank note or other money security for which my improvement may be applied, substantially as described.

28,371.—Samuel Hoffman, of Richmond, Va., for an Improvement in Sewing Machines:

I claim, first, The reciprocating shuttle, N, when so constructed that its bobbin shall revolve upon an axis perpendicular to the plane of its motion, and when one side is closed, in combination with an adjustable yielding pressure upon the thread after it has passed from the bobbin, as specified.

Second, Making the shuttle race adjustable in its depth, substantially in the manner and for the purpose set forth.

28,372.—J. S. Huggins, of Timmonsville, S. C., for an Improvement in Plows:

I claim, first, The adjustable helve, a, in combination with the slotted beam, A, and the removable shares; the whole constructed and operating as specified, for the purpose set forth.

Second, I claim the removable sword, g, in combination with the adjustable helve, a, and removable shares; the whole arranged and operating as specified, for the purpose set forth.

28,373.—Stephen Hull, of Poughkeepsie, N. Y., for an Improvement in Plates to Mills:

I claim attaching a cylinder, having a rough or grating surface, to the frame of grinding mills, with spring hoppers, when the cylinder is made to run in an upright position, or nearly so, in combination with portable grinding mills, substantially as and for the purposes set forth.

I also claim the cylinder with the diamond points in spiral rows, in combination with spring hoppers, when the cylinder is made to run in an upright position, or nearly so, substantially as set forth and for the purposes described.

28,374.—G. H. Hulskamp, of Troy, N. Y., for a Pianoforte Action:

I claim, first, The arrangement and construction of the action for pianofortes, substantially as set forth.

Second, I claim the regulating screw, L, secured to the key, and also the spring, M, to hold the hammer-lifter in its proper place, substantially as set forth, or its equivalent.

Third, I claim the improved back check, with spring fastened to the key, for the purpose set forth, substantially as described.

Fourth, I claim the lever, D D, jointed and connected with the hinge butt and hammer butt, to lift the hammer or its equivalent.

Fifth, I claim securing the hinge butt to its bar, in the manner and for the purpose set forth, or its equivalent, and the same device in other parts in the action.

38,375.—J. R. Ingersoll, of New York City, for an Improved Hair Brush:

I claim a brush provied with an elastic reservoir, so that by compression of some part thereof the liquid will be injected into the brush, as shown and described.

[The object of this invention is to combine with a brush—such as a hair-brush or paint-brush—a reservoir with elastic sides or with an elastic top, in such a manner that, by a pressure exerted on said reservoir, the oil or paint contained in the same is forced out to the bristles, which latter are arranged around small tubes through which the oil or paint is made to flow in order to reach the bristles.]

28,376.—D. C. Jordan, of Center Port, N. Y., for an Improvement in Hand Cultivators:

I claim the combination of the several parts described, whereby is obtained adjustibility and portability, when the same are arranged in the relation set forth, for the purposes specified; it being understood that I do not claim each part separately or irrespective of its substantial arrangement.

[The object of this invention is to obtain a cheap and portable hand cultivator, for eradicating weeds and loosening the soil in drill husbandry, and for passing where the plow would be too cumbrous—to eradicate the weeds with their roots from about young and tender plants, and to open the soil to admit air, warmth and dew to the roots of the plants by scraping and raking away the weeds at the same time. The invention provides for adjusting the several parts, so as to adapt them to different kinds of work and for narrow or wider spaces.]

28,377.—J. W. Kerr, of Pittsburgh, Pa., for an Improvement in Gasaliers:

I claim combining with a gasalier, consisting of a cluster of gas-burners, placed in or near the mouth of a flaming pipe or tube, a ventilating pipe, D, and screw, B, constructed and arranged substantially as described, for the purposes of ventilation and increasing the brilliancy of the light.

28,378.—Leonard King, of Bridgeport, Conn., for a Fire-escape:

I claim, first, The employment of the ladder, D, in place of the perch, for connecting the fore wheels, A, and the hind wheels, substantially in the manner described.

Second, The combination of the hinged legs, F, and brake, substantially as described, for the purpose of securing the hind wheels with the frame, C, in the desired place and position.

Third, The arrangement and combination with the ladders, D, of the sliding head, e, operated by a screw e', substantially as and for the purpose specified.

Fourth, The arrangement of the sockets, k, in the ends of the axle, d, of the hind wheels, in combination with the braces, J, constructed and operating substantially as and for the purpose set forth.

Fifth, The arrangement and combination of the fore wheels, A, catch, E, ladders, D, hind wheels, B, and frame, C, substantially as and for the purpose described.

[This invention combines the advantages of the celebrated London fire-escape with the ordinary hook-and-ladder truck. When the ladders are down, they form the only connection between the two trucks, thus taking the place of the perch, and when the ladders are elevated, they rest on the front truck in such a manner that they can be moved from place to place with the greatest facility.]

28,379.—A. Kirlin, of New Boston, Ill., for an Improvement in Seeding Machines:

I claim the drums, G G, with their side cams and cups, arranged as set forth, and operated by the marker wheels, E E, in combination with the yoke rods, K, and valve bottoms, J, as and for the purposes set forth.

[This invention is a novel device, or arrangement of devices, for dropping seed in hills, or for sowing them in drills at regular intervals apart, consisting in the arrangement of rotary cylinders in the bottoms of two hoppers for planting in two rows at one time, having suitable cups punched in them for receiving and dropping seed into a vertical seed tube as they are rotated, and having on each of their sides a number of suitable cams for operating valves placed in the bottom of the seed tubes, so that the dropping of the seed, say corn, from the hoppers into the bottom of the tubes, and the dropping of said seed from the seed tubes, will take place alternately, thereby enabling the operator to bring the bottom of the seed tubes very near the ground and drop the seed instantly from them into the hills, regularly and without scattering the seed.]

28,380.—Louis Knocke, of Davenport, Iowa, for a Fire-escape:

I claim, first, The combination and arrangement of a movable platform, a, with hinged sides, c f d e, a hinged and jointed mast, p q, carriage, c' k', staples, y, and anchor bars, x, substantially as and for the purposes set forth.

Second, Combining a movable platform with hinged sides, which consist of hinged railings, d e, a hinged bottom, f, and a ladder, c, substantially as and for the purposes set forth.

Third, Combining the carriage, c' k', with tapering cross beams, n', staples, y, and anchor beams, x, substantially as and for the purposes set forth.

28,381.—Gottfried Kober, of New York City, for an Improvement in Machines for Making Lozenges:

I claim, first, The arrangement and combination of the vibrating arms, D, the spring, F, cutters, h, scrapers, e and f, and pistons, l, constructed and operating substantially as and for the purpose specified.

Second, I claim, in combination with the pistons, l, and cutters, h, the coloring roller, P, when the same is operated by vibrating arms, Q, or their equivalents, so as to sweep over the faces of the pistons, substantially in the manner and for the purpose described.

[The object of this invention is to produce a simple and efficient mechanism for cutting out the lozenges, giving to them the desired color and impress them with suitable letters or inscriptions.]

28,382.—T. B. Lamb, of Summit, Mich., for an Improved Vise:

I claim the combination of the gripers, J J, pressure eccentric, L, and serrated bar, F, with the socket, I, and jaws, B D, as and for the purpose shown and described.

[The object of this invention is to obtain a vise, the movable jaw of which may be quickly adjusted and still be made to grasp the article to be held very firmly, or, in other words, to obtain a quick movement of the jaw, and, at the same time, have a good leverage power by which the article to be held may be firmly secured between the jaws.]

28,383.—Joel Lee, of Galesburgh, Ill., for an Improvement in Corn Planters:

I claim, first, The feet, formed and constructed as described, the plunger, the friction rollers, the cam and the oscillating arm, to save friction of the plunger, when the same are arranged and used in the manner and for the purpose specified.

Second, The arrangement of the seed chamber in the foot, with the cut-off valve, the oscillating arm and the groove in the top of the dropper, when used as and for the purpose specified.

28,384.—Wm. N. Lockwood, of New Britain, Conn., for an Improvement in Ox-yoke Fastenings:

I claim the pin, C, and horn, D, attached to the same stock, as described, and operating in combination with the ox-bow, B, as a fastening for ox-yokes, substantially as set forth.

28,385.—Paul Marcelin and Earnest Eude, of New Orleans, La., for an Improvement in Apparatuses for Clarifying Cane Juice:

We claim the combination of the furnace, washer, pumps, gasometer, tester, receivers, water column and alembic; the whole being constructed, arranged and operated substantially as set forth, for the purposes described.

Second, We also claim the use of the gasometer, K, and gas-tester, Y, in combination with either the pumps, H, and furnace, A, or with the alembic, I, substantially in the manner and for the purposes specified.

28,386.—J. W. Masten, of Utica, Mich., for an Improvement in Seed Planters:

I claim, first, The adjustable hinged projection, I, on the seed slide, G, in combination with the cams, e e, on wheel, H', substantially as and for the purposes set forth.

Second, The arrangement of the partitioned hopper, A, distributing seed slide, G, spring cut-offs, g, adjustable hinged projection, I, wheel, H', with cams, e e, main frame, a, and jointed frame, C, in the manner and for the purposes set forth.

28,387.—John Masters, of Waukegan, Ill., for an Improvement in Ditching Machines:

I claim, first, The combination, with the trough and elevators, of the adjustable standards, M M, adjustable cross brace, N, chain, P, and windlass, P', arranged and operating substantially as set forth.

Second, I claim, in combination with the adjustable caster wheel and standard, D, the two adjustable inclined slotted colters, S S, arranged as and for the purposes set forth.

[The object of this invention is to obtain a machine which will form a ditch and elevate and discharge the excavated earth to one side of the ditch, however deep it is found desirable to dig down. The machine is to be drawn along by a team in the usual manner of plowing, and passed back and forth over the ditch until the required depth has been attained. It is to be so constructed that digging and elevating parts can be adjusted—raised or depressed—and braced rigidly, and secured so as to form a strong and powerful machine.]

28,388.—T. J. Mayall, of Roxbury, Mass., for an Improvement in the Manufacture of Rubber Hose:

I claim the mode of vulcanizing india-rubber or gutta-percha hose or tubing, by heating the same in sheets of flexible metal, thereby gaining greater strength and a smooth surface to the hose or tubing.

28,389.—T. J. Mayall, of Roxbury, Mass., for an Improvement in Rubber Hose Tubing:

I claim, first, Filling, or partially filling, a woven tube, composed of cotton, flax or other fibrous materials, with any proper rubber cement, and then driving the said cement into the inner surface of the woven tube, so as to form a waterproof lining therein, by means of rolls or other devices for accomplishing the desired result, applied to the outside of the woven tube.

Second, I claim inserting within the woven tube, coated on its interior surface with an adhesive cement, as described, an inner tube of rubber or gutta-percha, so that the woven tube and inner tube can be united by vulcanizing, as set forth, and for the purpose of forming a smooth bore to the hose or tubing.

Third, I claim sprinkling or dusting the outer surface of the rubber or gutta-percha tube, that is, to form the lining of the hose, with such a non-adhesive material as shall incorporate with the adhesive cement on the inner surface of the woven tube when heated or cured, as set forth.

28,390.—W. T. McMillen, of St. Louis, Mo., for an Improved Coal Grate:

I claim the arrangement and location of the hot-air chambers, H I I' J, with their communicating passages and with regard to the fire-box and the driving and ascending flues, L M, whereby I economize heating and radiating surface without impeding the draft, as set forth.

28,391.—M. C. Meigs, of Washington, D. C., for an Improvement in Valves for Hydrants, &c.:

I claim, first, The combination of a barrel or slide having the contrivance for regulating the flow of water through the barrel or slide by means of serrations, or notches, or perforations of proper form, and extending to and terminating at different depths or hights above the seat of the poppet valve, forming a slide poppet valve.

Second, The combination of the conical plug or many-way valve, used as a stopcock for governing the distribution and flow of water at the intersection of two or more water mains or distributing pipes, with the serrated or perforated slide poppet valve for a hydrant, the valves thus combined into one being lifted and depressed by a single screw.

Third, The combination and arrangement of the various parts into a many-way stopcock and hydrant or fire-plug, substantially as described and set forth.

28,392.—A. P. Merrill, Jr., of Natchez, Miss., for an Improvement in Locks for Cotton Bales:

I claim the combination of the rounded-out notches in the end of the strap, band or hoop, and the pyramidal shaped opening in the buckle, for the purpose of forming a lock or fastening to the hoops of cotton and other bales, and when constructed to operate together, substantially as described.

28,393.—Purches Miles, of New Haven, Conn., for an Improved Meat-cutter:

I claim, first, The combination with the cap, H, of the screen, h h', in the manner shown and described, so that the meat cannot be discharged until properly cut, all as specified.

Second, The employment of the plunger, K, in combination with the screen, h h', as and for the purposes set forth.

Third, The employment of taper-formed pendants, g, in combination with the eccentrically arranged cutters, B, as and for the purposes shown and described.

Fourth, The employment of the spring, G, and stop, D, in combination with the screen, h h', as and for the purposes set forth.

[The object of this invention is to obtain a simple, economical and efficient machine by which meat may be readily minced or cut, and the same device used, when required, as a sausage-stuffer, both operations being performed simultaneously. The invention also has for its object the ready accessibility of all its parts, so that the same may be easily cleansed, the knives removed, sharpened and replaced, and all kept in proper working order.]

28,394.—J. S. Miller and S. L. Wiegand, of Philadelphia, Pa., for an Improved Machine for Printing Butter:

We claim, first, The mold, A, and follower or piston, M, and the lug, O, used in the manner and for the purposes described.

Second, The treadle, F, link, G, lever, E, and links, D and D', operating the mold, A, and piston, M, substantially in the manner and for the purposes described.

28,395.—G. A. Mitchell, of Turner, Maine, for an Improved Jointed Tip for Boots and Shoes:

I claim the construction and application of the described tip, made jointed or in sections, substantially in the manner and for the purposes fully set forth.

28,396.—Daniel Montague, of New Bedford, Mass., and James Townsend, of Gardiner, Maine, for an Improved Glass Door Plate:

We claim, first, The combination of a hollow glass door or name-plate, A, spring fastening strip or bar, B, and elastic mat or cushion, D, substantially in the manner and for the purpose described.

Second, The spring fastening strip, provided with screw bolts, arranged within the hollow glass door or name-plate, A, and having its ends confined in grooves, a a, of the glass plate, A, substantially as and for the purpose set forth.

[This invention consists in a hollow plate formed entirely of glass, and a name wrought upon its face in any of the known ways. With-

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in the glass plate a spring bar is placed, said bar having two screw bolts projecting from its rear side. To attach the plate to a door, no iron frame is necessary, and all that has to be done is to place an india-rubber mat or washer between the door and the plate, and pass the screw bolts through the door and confine them by nuts. This door-plate presents an exceedingly handsome appearance, and, when lined inside with a metallic coating, can hardly de distinguished from the most highly polished silver.]

28,397.—Orrin Newton, of Pittsburgh, Pa., for an Improvement in Making Sheet Metal Caps, &c.:

I claim the use of a die, or succession of dies, each having a smaller cavity than the preced ing one, the mouth of each die being of the diameter of the blank or unfinished cap to be operated upon, and the diameter of the cavity rapidly dimishing through part of its depth and thence to the bottom, having the same angle to the axis of the die as the sides of the finished cap are designed to present to its axis, with a plunger or plungers fitting into said die of the same shape as the lower part of the dies, and of such diameter as, together with the metal of the disk or cap, to fill up the entire diameter of the dies, for the purpose of drawing out radially and contracting circumferentially the edge of metallic disks so as to form seamless caps or boxes, substantially in the manner described.

28,398.—H. L. Nichols, of New York City, for an Improved Carpet-cleaner:

I claim the rotary brush and blastboards, a, in combination with vibrating beating arms, m m, arranged substantially as and for the purposes set forth.

28,399.—James Nute, of East Boston, Mass., for an Improvement in Hanging Topsail Yards:

I claim supporting the yard, E, independently of the top mast, substantially as shown and described, so that, in case the top mast is carried away, the yard will still remain supported, all as set forth.

28,400.—G. M. Nye and A. T. Haviland, of Elmira, N. Y., for an Improved Hollow Auger:

We claim, first, The combination and arrangement of the cutting lips or edges, e f, having their inclinations alternately reversed, so that one cuts in a direction which crosses that of the preceding one; said cutters being formed with a series of planes and grooves, i i, upon their faces, substantially in the manner and for the purposes specified.

Second, I claim the vertical spurs, g g, in combination with the alternate cutters.

28,401.—Charles Oyston, of Little Falls, N. Y., for an Improvement in Power Presses:

I claim the combination of the internally geared sector, C, formed as shown, with the sector, D, pinion, E, follower, B, rods, G H, lever, J, crank, N, and pawls, K P, the said parts being constructed and arranged to operate, as and for the purpose shown and described.

[This invention is intended more especially for cotton, hay or cheese presses, and the object to be attained is to give an equal pressure to each end of the follower, and to keep it parallel in its up-and-down movement; and to obtain a regular continuous multiplied power as the follower descends, and at the same time to obtain facility of operation and a cheap press.]

28,402.—C. W. Packer, of Philadelphia, Pa., for an Improvement in Ice Cream Freezers:

I claim the revolving vessel, C, in combination with stationary inclined blades, K and K′, and inclined deflectors, x and x′, the whole being arranged and operating as and for the purpose set forth.

28,403.—Louis Planer, of New York City, for an Improvement in Converting Motion:

I claim, first, The employment of the hinged cam, E, in combination with the dogs, C D, and grooved wheel, A, constructed and operating as and for the purpose described.

Second, Arranging the dogs, C D, with V-shaped edges, l m, to fit into a corresponding V-shaped groove or recess, B, in the wheel, A, substantially in the manner and for the purpose specified.

Third, Giving to the advancing corners, c′ d′, of the dogs, C D, the shape of knife-edges, substantially as and for the purpose set forth.

Fourth, Arranging the surface of the dog, C, in such a manner that its rear edge projects above the upper edge of the recess, B, and that all the dirt scraped off by the advancing corner, c′, is caused to discharge over the wheel, A, substantially as described.

28,404.—J. F. Pond, of Cleveland, Ohio, for an Improved Washing Machine:

I claim the obliquely-fluted spring bed, C, substantially as described, in combination with the fluted roller, R, arranged and operating substantially as and for the purpose specified.

28,405.—Washburn Race, of Seneca Falls, N. Y., for an Improvement in Pumps:

I claim suspending the spout piece, H, and its dependent parts, in the hollow standard, A, by a conical bearing, or its equivalent, the p rts suspended being free from any connection or support except the said suspension bearing, substantially as and for the purposes specified.

In combination with the above suspension of parts in the standard, A, I also claim the arrangement of the spout piece, H, and standard, A, so that the spout may be turned at any moment either to the right or left position in relation to the working lever, as described.

I also claim the arrangement of the grooves or flutes, b b, in the conical bearing of the spout piece, or correspondently in the standard, as specified, so as to apply the means of ventilating the well to the additional purpose of preventing the freezing of the water within the spout piece, substantially as set forth.

28,406.—Andrew Rankin, of Philadelphia, Pa., for an Improved Lock:

I claim the supplementary tumbler, its spring, r, its projections, t and u, and shoulder, q, all of the form described, in combination with the spring, p, and stop, s, the whole (with the bolt) being arranged for joint action, as and for the purpose set forth.

28,407.—I. N. Rankin, of Middletown, Iowa, for an Improvement in Plows:

I claim the arrangement of the double curved standards, C C, braces, F F, bars, E, landsides, D D, shoes, C′ C′, handles, B B, and beam, A, as and for the purpose shown and described.

[The object of this invention is to avoid a great portion of the friction attending the operation of ordinary plows, and thereby obtain an implement of light draught, and one that may be advantageously used for subsoiling. The invention consists in having the standards so curved or constructed that, while serving as rigid supports for the plows, they will be kept free from contact with the land; the standards, by their construction, also dispensing with the projection of the handles below the team, so that the handle cannot catch weeds and trash to impede the progress of the implement and the proper operation of the same.]

28,408.—M. G. Rhodes and J. M. Skaggs, of Talladega, Ala., for an Improvement in Plows:

We claim the combination of the standard, A, rods, a b c a′ b′ c′ and d d′ f, substantially as described, for the purpose of producing a new and improved plow-stock.

[This invention consists in a peculiar construction of the plow stock, making the same entirely of iron rods fastened together by means of screws, in such a manner that both the beam and the handles can be adjusted, and that a light and strong stock is produced.]

28,409.—Clark Roberts, of Winchester, Ill., for an Improved Washing Machine:

I claim, first, The peculiar construction and arrangement of the levers in combination with the turners or stirrers, substantially as described and for the purposes set forth.

Second, A hinged or opening shaft bearing, fastened and secured by a swinging cap, g, substantially as described.

28,410.—T. N. Read, of Aspen Wall, Va., for an Improvement in Tobacco Presses:

I claim, in combination with a hinged presser beam carrying at its free end the gearing and the person or persons who operate the press, a hinged rack, which is held up to the gearing by a presser roll, or its equivalent, substantially in the manner and for the purpose set forth and explained.

28,411.—M. S. Root, of Medina, Ohio, for an Improvement in Seeding Harrows:

I claim the special arrangement of adjustable jointed frame, B, harrows, Fig. 2, and seeding machine, Figs. 3 and 5, when combined and operating in the manner and for the purposes described.

28,412.—S. T. Sanford, of Fall River, Mass., for an Improved Vegetable-slicer:

I claim, as an improved article of manufacture, a vegetable cutter, composed of a table, A, hopper, B, knives, D, uprights, D′ D′, followers, F, toggle rod, G, lever, H, when arranged and constructed as shown and described.

[The object of this invention is to obtain a simple, efficient and economical device for cutting vegetables for domestic use and for fodder for cattle. The invention consists in the employment or use of a series of stationary knives or cutters placed within a suitable hopper or box, in connection with a follower or plunger fitted between guides, and operated by means of levers to effect the desired end.]

28,413.—Theodore Sellers, of East Birmingham, Pa., for an Improvement in Preserve Cans:

I claim the use of a cylindrical ring of india-rubber, or other elastic material, in combination with and interposed between the neck of a bottle or jar and its cap or cover, each having a corresponding groove or recess for the reception of the ring, constructed and arranged substantially as described.

28,414.—Amos Shepard, of Southington, Conn., for an Improved Sausage-filler:

I claim arranging the cam or cams, C C, in combination with the cut-off, E, and the valve, G, as and for the purposes described.

28,415.—Isaac Sherman, of Cleveland, Ohio, for an Improvement in Evaporating Apparatuses:

I claim making a sugar pan, as described, having one or more perforated tin strainer across the pan, near the outside of the fire surface, and gates placed transversely outside of the fire surface, so as to keep any sediment or other impurity from passing into the boiling part of the pan; and further, to allow the scum that rises from the boiling mass to flow over the strainer and settle there, so that it can be removed at the will of the operator.

28,416.—C. I. Shiver, of Camden, S. C., for an Improvement in Plows:

I claim the arrangement of the double-curved frame, C, horizontal bar, e, bars, d d, eyes, f f, beam, A, and share, D, as and for the purposes shown and described.

[This invention is more especially designed for the culture of cotton, although it may be advantageously used for cultivating other crops which are grown in hills or drills. The invention consists, 1st, in the employment or use of a share peculiarly constructed, so as to turn the sod or earth at one side and serve as a cutter or shaver at other; 2d, in the manner of attaching said share to its standard; 3d, in a peculiar frame, of which the share standard forms a part; and 4th, in a clevis of novel and improved construction.]

28,417.—J. M. Stephenson, of Anderson, Ind., for an Improvement in Pumps:

I claim the arrangement and combination of the separate chamber, F, with the pump cylinder, A, inlet orifices, d d, and pipes, J J, as and for the purpose shown and described.

[This invention belongs to the class known as the reciprocating rotary pump, and consists in a novel arrangement of the cylinder induction and eduction orifices, with a separate air-chamber and dirt-receiver, whereby the pump can be kept in a perfect working order and sand entering the induction or suction pipes will be deposited in this chamber, and the piston cylinder will be kept from its injurious effects.]

28,418.—B. T. Stowell, of Quincy, Ill., for an Improvement in Corn Planters:

I claim the arrangement and combination with a hub, G, composed of one piece of the radial recesses, c, to receive the spokes, the annular recess, e, to receive the seeds, and the adjustable plates, f, as and for the purposes shown and described.

[This invention consists in a novel and improved arrangement and construction of seed distributing wheels, for the purpose of nicely graduating the quantity of seed to be sown on a given space or area.]

28,419.—W. H. Trissler, of Lima, Ind., for an Improved Fruit and Vegetable-cutter:

I claim the arrangement of the hopper box, A, the sliding cutter bottom, D, the follower, C, the hand lever, B, the pitman, F, and the crank shaft, G, with each other and with the supporting bench, K, in the manner and for the purpose set forth.

28,420.—J. T. Trotter and I. F. Williams, of New York City, for an Improvement in Finishing the Surface of India-rubber Goods:

We claim the process or method of fixing or finishing the coating of flock, cork, or other fibrous material by the use of camphene, naphtha, bi-sulphide of carbon, or other solvents of any of the vulcanizable gums, when applied by means of the sizing roller or machine, as described, as a secondary or additional operation for fixing or finishing the surface of the previously flocked goods, substantially as set forth.

28,421.—A. K. Tupper, of Milford, Mich., for an Improvement in Apparatuses for Generating Gas:

I claim the retort, A, having on one side, below the feed-pipe, a series of gutters, rranged with a descent from one to the other in opposite directions, alternately, and having a narrow space between the said gutters and the opposite side for the upward escape of the gas and vapors, substantially as described.

[This invention consists in a certain novel construction of a gas retort for the generation of gas from liquid substances, or substances which are liquified by heat, whereby it is adapted to be heated by the fire of a domestic stove.]

28,422.—Wm. Tusch, of Brooklyn, N. Y., for an Improvement in Brushes:

I claim, as an improved article of manufacture, a brush, having its back provided with curved or angular plates which will cut into and hold the soap when the latter is pushed thereon, as shown and described.

28,423.—W. J. Tustin, of Benicia, Cal., for an Improvement in Windmills:

I claim the arrangement of the regulating fans, G, on the shaft, C, when the same are connected to the driving sails, A, by means of links, e, together with a spring, I, substantially as and for the purpose described.

[This invention consists in arranging on the shaft of the driving sails, and on arms which turn loosely on said shaft, a series of regulating fans, which (or the arms of which) connect with the windward edge of the driving sails in such a manner that, whenever the velocity of the windwheel exceeds a certain point, the resistance of the regulating fans causes the driving sails to turn to the wind and to decrease their effective surface. And it consists further in combining with the arms of the driving sails and with those of the regulating fan an adjustable spring, in such a manner that the velocity at which the regulating fan begins to act can be varied at pleasure.]

28,424.—A. T. Twing and Ebenezer Wood, of Lansingburgh, N. Y., and W. Elderhorst, of Troy, N. Y., for an Improvement in Preserve Cans:

We claim, first, The employment of the neck, B, of a preserve can, A, as a receiver for an air pump, applied to the same by means of a chamber, D, substantially as and for the purposes specified.

Second, The arrangement of the chamber, D, with the channels, c d, and with a funnel, E, when the same is used in combination with a fruit can, A, substantially as and for the purposes set forth.

[The object of this invention is to remove the air from the interior of a fruit can without heating the contents, and to s al the same up perfectly tight, and with an easy manipulation, without giving the air a chance to find its way back to the interior of the can.]

28,425.—R. L. Underhill, of Bath, N. Y., for an Improved Door Latch:

I claim the employment or use, in connection with a sliding knob arbor, B, of bolts, E H, fitted respectively in the door, A, and stile, F, and arranged, in relation with each other and the knob arbor, to operate as and for the purpose set forth.

[The object of this invention is to obtain a latch of simple construction that may be readily applied to a door and operated with greater facility than those of usual construction, so that a child or a person with the hands occupied in holding articles can readily actuate the latch and open the door, as the turning of the knob is not required, as hitherto, to effect the result; the invention at the same time obviating the exposure of the latch when the door is open, and thereby preventing the tearing of ladies' dresses, a contingency which frequently occurs in the use of the ordinary door latches.]

28,426.—Abraham Voorhees, of Grand Rapids, Mich., for an Improvement in Shortening Tire:

I claim the arrangement of the clamping bars, C H, short clamping anvil block, K, and detached lever or slide, L, working between guides, F G, as set forth, for the purpose of clamping and upsetting or shortening wagon tires, as described and represented.

28,427.—J. A. Wagner, of Pultney, N. Y., for an Improvement in Harvesting Machines:

I claim the revolving canvas, G, acting in concert with cylinders, E E, spiral knives, F F F F, and straight knife, I, adjusted on spring, 1 2, set on the base of teeth, H, substantially as and for the purpose described and set forth.

28,428.—S. W. Warren, of New York City, for an Improvement in Apparatus for Vulcanizing Caoutchouc:

I claim the portable vulcanizing apparatus constructed substantially as set forth and for the purposes specified.

28,429.—James Weed, of Muscatine, Iowa, for an Improvement in Power Presses:

I claim the employment or use of toggles or toggle frames, applied to the press or follower substantially as described, so as to admit of repeated applications of their power during a single movement or stroke of the follower, or, in other words, during the compression of each bale, for the purpose specified.

28,430.—J. W. Willett, of Wareham, Mass., for an Improved Camp Stool:

I claim the said improved portable folding chair, as made with its back posts and arm-rests or the latter hinged or connected to the crossed leg frames and the flexible seat, and having struts applied to them, substantially as specified.

28,431.—Charles Wooster, of New York City, for an Improvement in Gas Retorts:

I claim the employment of the central flue, b b, in combination with the body or shell, A, substantially as and for the purposes shown and described.

[This invention relates to upright retorts for generating gas from oil, resin or other fluid substance or substances which are rendered fluid by heat. It consists, 1. In the employment, in combination with a direct central flue which constitutes the base of the chimney, of a divided annular cover, whose two parts are united by a fusible metal joint running acros the retort. It consists, 2. In the employment, in combination with a fusible metal joint provided between the cover and the flue or chimney base, of an upwardly projecting rim on the cover, fitting around the flue or chimney base, and an opening in the flue or chimney base, just above the fusible metal joint, for the purpose of establishing a communication from the retort to the chimney when it is desired to burn out the residuary carbon. It consists, 3. In the employment, in combination with the central flue or chimney base, of a cone dependent from the annular cover of the retort, to present an extensive heating surface for the decomposition of vapors and their conversion into gas.]

28,432.—H. A. Alden, of Matteawan, N. Y., assignor to the New York Rubber Company, for an Improvement in Flexible Hose Tubing:

I claim, as a new and useful article of manufacture, a compound flexible tubing or hose formed of close or woven and lapped tubes, with water-proof coatings or linings, and combined as described.

28,433.—C. R. Alsop, of Middletown, Conn., assignor to J. W. Alsop, of New York City, for an Improvement in Gun Stocks:

I claim the construction of the stock of a fire-arm intended to be fired from the shoulder, with an opening, B, for the thumb to pass through, and for the reception of the ball of the thumb, and with the portion, D, in front of the said opening, so nearly perpendicular to the barrel as to allow it to be grasped by the hand, with the thumb through the said opening, substantially as described and represented in Fig. 1 of the drawing, whether the butt, A, is or is not capable of disconnection.

And I also claim the attachment and securing of the two parts of the stock together by means of a round tenon or dowel, b, and a dovetail tongue, c, on the rear portion, a corresponding mortise and dovetail groove in the front portion, and a spring bolt, E, applied within the front portion, to lock the dovetail tongue therein—the whole applied and operating substantially as specified.

28,434.—Charles Badger (assignor to Melville Badger), of Edgerton, Wis., for an Improvement in Grist Mills:

I claim, first, The framework, 27, in which the gearing is located, in combination with the vertical shaft and runner, when arranged substantially as described and for the purposes set forth.

Second, The combination of the devices for driving the runner with the devices for driving the bolt, when constructed and operated substantially as described.

Third, The cog gears on each side of the pinion, in combination with the pinion and shaft in Fig. 27, substantially as described and for the purpose set forth.

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28,435.—J. P. Ellicott, of Washington, D. C., assignor to Phelan & Collender, of New York City, for an Improved Chalk-holder for Billiard Tables:

I claim the combination of the lower pivoted jaw, c g, constructed as described, with the stationary jaw, b b, for the purposes set forth.

28,436.—S. W. Brown, of Syracuse, N. Y., assignor to himself and Joel McComber, of Watertown, N. Y., for an Improved Printer's Composing Stick:

I claim the employment or use of the elastic plate, E, placed at the outer side of the side piece, C, provided with a tongue, d, passing through the side piece and part, b, of the slide, and having attached a lever, F, provided with an eccentric, G, arranged as shown, or in an equivalent way, for the purpose set forth.

I further claim, in connection with the plate, E, slide, B, lever, F, and its eccentric, the bridge or brace, G, attached to the slotted side-piece, C, substantially as and for the purpose set forth.

[This invention relates to an improved means for securing the slide at any desired point within the range of its movement in the stick, and it consists in the employment of an eccentric and elastic plate, connected with the slide and applied to the side of the stick, whereby the slide may be readily adjusted and secured at any point, without being liable to move casually; the stick, at the same time, being provided with a bridge or brace, one or more, so arranged or applied to the slotted side-piece as to render the same strong and durable.]

28,437.—A. J. Gibson (assignor to himself, John Boyden, J. P. Hale and Samuel Fisk), of Worcester, Mass., for an Improvement in Revolving Fire-arms:

I claim, first, Combining the barrel with the breech frame or stock by means of a pivot, b, two doubly-notched check-pieces, a a, and a sliding bolt, E; the whole arranged and operating substantially as and for the purpose specified.

Second, Combining the downwardly-movable barrel with the trigger or lever, I, or its equivalent, in such manner that the said barrel may lock the said trigger or lever, or its equivalent, when it (the said barrel) is in its downward position, to prevent the discharge, substantially as described.

28,438.—Adolphus Liebenroth (assignor to himself and Ivan Von Auw), of New York City, for an Improved Paper File:

I claim the combination of the elastic bands, c c e e, covers, a d, and tuck or attachment, f, for the purposes and as specified.

28,439.—G. H. Mills (assignor to Nathaniel McKay), of East Boston, Mass., for an Improvement in Pumps:

I claim the employment of the intermediate cylinder, H, in combination with the two stationary cylinders, A C, and piston, B, as and for the purpose shown and described.

28,440.—J. G. Putnam (assignor to himself and J. Schiefflein, Jr.), of Tioga, Pa., for an Improvement in Corn-shellers:

I claim the arrangement of the divided, yielding, pergorated concave, E, feeder, B, prongs, b, guard plate, J, guard, L, and shelling cylinder, D, as and for the purpose shown and described.

[This invention consists in an arrangement of a feeder for conducting the ear of corn properly into the machine, a toothed cylinder and concave for removing the corn from the cob, a series of curved guards for clearing the cylinder and throwing-off the cobs, and an arrangement of plates for conducting the shelled corn down through a spout, so that it will receive a blast of air which blows off the dust and other extraneous matter which are found more or less combined with it.

28,441.—Isaac Reckhow (assignor to John Griffith), of Brooklyn, N. Y., for an Improvement in Curing Prunes:

I claim the within-described method of curing prunes by exposing them to a current of steam, substantially in the manner specified.

28,442.—Mark Richardson (assignor to himself, T. Cort and H. Rowbotham), of Philadelphia, Pa., for an Improved Washing Machine:

I claim, first, The revolving beaters constructed substantially a described, in combination with the platforms, e f and h; the whole arranged within the trough and operating on the folds of the fabric as specified.

Second, The revolving shaft, K, with its elastic vanes, when arranged within the trough in respect to the roller, H, and the mouth of the inlet, y, substantially as and for the purpose herein set forth.

28,443.—D. M. Smith (assignor to himself, H. H. Mason and A. C. Mason), of Springfield, Vt., for an Improvement in Hooks and Eyes:

I claim, as an improved article of manufacture, a hook, A, having one of its legs, e, extended and bent up within the bill, a, so as to form a snap or spring guard, as shown and described.

28,444.—J. S. Vaughan (assignor to himself and S. R. Vaughan) of Alexandria, Va., for an Improvement in Car Couplings:

I claim the arrangement of the skeleton bumper, H, which surrounds the box with the box and with the tumbler, for the purpose of relieving the tumbler from sudden and violent concussions, substantially as specified.

28,445.—Samuel Wells, of Elmore, Ohio, assignor to Eliab Karr and Erastus Howland, of Elmore aforesaid, and E. F. Dickinson, of Tremont, Ohio, for an Improved Machine for Moving Buildings:

I claim, in combination with the carriage, A, and the drums, B E, and their operating connections, the turning block, F, hinged to said frame, and loose block, H, and their rigging—the whole being arranged for the purpose of exerting great power in moving heavy bodies, and easy transportation, substantially as described.

RE-ISSUES.

The Wilson Manufacturing Company, of New York City, assignees of John P. Wilson, of Frankfort, N. Y. and John P. Thomas, of Ilion, N. Y., for an Improvement in Burglar's Alarms. Patented Feb. 8, 1859:

I claim, first, The employment, in connection with the within-described gun or alarm, of an adjustable gimlet screw, D, which is secured in the dovetailed groove in the body, while in use, and which is secured in the barrel or bore by a screw, when not in use, substantially as specified.

Second, The employment of the two sides, A' A', between which the hammer falls, which serve to prevent the particles of the cap from flying off, and at the same time forming a snug protection for the hammer and causing a louder report of the cap as is herein fully described.

Third, Securing the rear of the spring, F, to the body of the gun, by means of the nipple which passes through said spring and screws into the body, substantially as and for the purpose specified.

Lewis White, of Hartford, Conn., assignor to S. S. Putnam & Co., of Roxbury, Mass., for an Improvement in Curtain Fixtures. Patented Jan. 15, 1856:

I claim operating the lever, c, which arrests the curtain roll, by means of the cord which raises the curtain, whereby the curtain is held stationary when the cord hangs vertically and is set free to be raised or lowered, when the cord is drawn at an angle, as set forth.

C. B. Brinckerhoff, of Batavia, N. Y., for an Improvement in Harvesters. Patented May 24, 1859:

I claim, first, The combination of the crank operated by the main shaft, with the rake and sweep post to which it is attached, and the eighth arm, when arranged in the manner described.

Second, The wire-gauze divider or its equivalent, when arranged on the rake head as set forth, to divide the falling grain from that which is being removed by the rake, as described and for the purpose specified.

Third, The pivoted sweep post, with its eighth arm, in combination with the crank, H, and the mechanism connecting them, giving the reciprocating motion to the rake; the whole being constructed, arranged and operated substantially as described.

Fourth, The arrangement, substantially as described, of the connecting rods, O and N, sleeve, L, and slide, M, in advance of, and in relation to the main shaft and rake shank, as and for the purpose specified.

Fifth, The spring catch, C, and dog, a, in combination, and the location of said catch, to break the forward motion of the rake and aid its return by the spring, substantially as described.

Sixth, The projection on the lower side of the slot or notch in the dog, to arrest the catch with certainty in the manner described.

Seventh, The application and arrangement of the toothed rack connected with the spring by which the rake is caught and held after its descent upon the cut grain on the platform, and whereby its rebound is prevented, and the gavel is removed with greater certainty and regularity.

Eighth, The placing of a rake having spring teeth, in rear of the machine, for the purpose of gleaning and contracting the gavels into sheaf form, substantially as described.

Ninth, The combination of the cam attached to the main shaft with the arm of the rear rake, to cause it to pass over the gavels at the proper time, as described.

Tenth, The ratchet cam, J, and lever, in combination, substantially as described, for throwing both rakes into or out of action, as set forth.

EXTENSION.

Alfred Stillman, late of New York City (Elizabeth A. Harris, administratrix), for an Improvement in Sugar Pans. Patented May 16, 1846:

I claim dividing the main pipe into two parts by a cross partition, in combination with the bent branch tubes that connect each with the two divisions of the main pipe, as described, for the circulation of the steam.

I also claim connecting the main pipe with the sides of the pan, and with the induction and eduction pipes, by means of the double stuffing boxes on each end, as described, to admit of the turning of the main pipe, as described.

And, finally, I claim the method of connecting the branch pipes with the main pipe by means of socket joints, as described, in combination with the mode of securing them by means of screws passing through the main pipe and tapped into tubular nuts in, and connected with the ends of, the branch pipes, by wings, for the purpose and in the manner described.

Notes & Queries.

W. S. H., of Ohio.—You can remove stains from German silver with sweet oil and rottenstone. It may require considerable rubbing with a brush at first, and soft leather to polish up afterwards; but persevere, and you will accomplish the object. Your subscription expires with No. 10, Vol. III.

C. C. P., of Ohio.—We are not acquainted with any method of preserving skimmed milk, so as to retain it in its normal condition for your purposes; but it can be concentrated in vacuo by Gail Borden's process, and preserved in sealed cans, to be used in brine in the winter season.

S. L., of N. Y.—The greenish ink to which you refer, printed on the back of some envelopes, is made with the oxyd of chromium, and is very permanent. We cannot give you a recipe for extracting it from paper.

K. C. P., of N. J.—You request us to furnish you with the dimensions of one of our river steamboats, as you intend to make a model. The correct dimensions of new steamships and steamboats constructed at the port of New York are published regularly in our columns. You can adopt the proportions of any of these most suitable for your model.

J. S., of N. Y.—It is not stated on page 277, that Mr. Bogardus invented the ring and traveler, but that his "ring-traveler spindle has come into extensive use." His improvement rendered the ring-traveler more generally practical; but George Addison and Samuel H. Stevens, of New York, were, so far as we have investigated the subject, the inventors of the ring-traveler, per se; and it was a valuable improvement.

C. D., of Ohio.—The Australian boomerang is one of the most singular weapons that has ever been used, and the art of throwing it is perhaps as difficult an art as has ever been acquired by savage or civilized man. It is said that the native will throw it in a way so that it will dart forward some 60 feet, then rise up in the air, and return within a yard of the thrower. It is also said that they will throw it around a hill and hit a kangaroo's leg, which is out of sight, but the position of which they know. It is simply a piece of hard wood, 2 or 2½ feet in length, 2½ to 3 inches wide, and 1 inch thick in the middle; being flat on one side and rounded to edges on the other. It is bent edgewise, so as to preserve the plane of the flat side; the arc of its curve having a radius, perhaps, of 5 or 6 feet. We write from memory, and it is some four years since we saw the article. It is said that no civilized man ever learned to use one of these missiles.

W. G., of Md.—Common sheet iron will soon rust out, if employed to line the sides of a house, in order to prevent the entrance of rats. Galvanized sheets are much more durable. Sheet lead, being unaffected by air and moisture, will answer a better purpose; and yet there are some instances on record in which leaden water pipes have been cut through by rats. The whole area under the basement floors should be laid with a bed of hard concrete about four inches deep, so as to render it impervious to the rat tribe. Do not employ wood for any of your outside stairs or in the foundation walls, if you wish to make your house rat-proof, because an old "varmint" can cut through a plank or a sill nearly as fast as a Green Bay sawyer.

J. W., of N. Y.—In replying to your recent query (page 308, this volume), the figures 14.162 were erroneously written "24.162," and so printed in the third line of our comment on your letter.

F. B. W., of England.—Your plan of forcing air into a tight receiver, similar to a steam boiler, and then using this compressed air to drive a small engine, is not impracticable. The ordinary fan windmill is as simple and cheap as any.

J. H. W., of N. Y.—The articles on the expansion and contraction of cast iron in molds appeared in our columns several years ago, and referred to the expansion of the metal when poured into the mold: then contracting after it became cooler, and after it had hardened sufficiently, whereby it retained the clear impress of the pattern. The opinions then expressed related to both sand and metallic molds. Yours refer only to the former, and do not meet the whole case.

W. H., of N. Y.—A thin coating of boiled linseed oil, rendered quick-drying with the acetate of lead, will enamel the surface of leather, but that to which you refer as being used for artificial limbs must be made, we believe, by the regular manufacturers of enameled leather.

M. V., of Ga.—The specimens which you have sent us are the "common," not the "precious, garnet." The latter is of a beautiful deep-red color; yours are a brownish-red, imperfectly translucent.

T. McF., of Ala.—Heavy coal oil is used for lubricating machinery in England, and, although not equal to sperm, it is employed on account of being cheaper. Pure coal oil may be used in cotton factories in lamps, but it requires careful and intelligent management.

J. T. McD., of N. Y.—By cautiously adding litharge, acetate of lead, sulphate of zinc or oxyd of manganese to linseed oil, when boiling it, you will render it quick-drying when mixed with paint. We have never, however, seen paint that would dry almost as quickly as it is put on (which is the property you want) without considerable turpentine added, and this tends to injure its gloss and destroy its durability.

E. W., of Conn.—"Dick's Practica. Astronomer" will give you the information desired for the polishing of lenses.

J. R. A., of Conn.—An electric current will not pass through any length of wire. You will find solid information on this subject on pages 46 and 54, Vol. XIV. (old series), of the SCIENTIFIC AMERICAN.

D. G. M., of Mich.—We say that a second of time cannot be divided into spaces so that the aggregate of them will not make a full second. To say that the number would have to be infinite, is an improper use of the word infinite. In that connection, it conveys no meaning—expresses no idea.

J. M., of Kansas.—B. Pike & Sons, No. 518 Broadway, this city, are extensive dealers in optical instruments. The Patent Office reports are generally issued towards the close of the year. "Wells' Natural Philosophy" is a good elementary work, and "Newton's Principia" if you want to go into the subject profoundly. Book-binders' paste is made of flour and water, boiled. There is hardly any limit to the chemical apparatus which you may use; perhaps a retort and spirit lamp would be among the first things required.

MONEY RECEIVED

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, May 27, 1860:—

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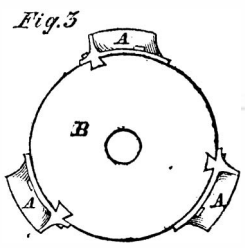
IMPROVEMENT IN SHIPS AND PROPELLERS.

Mitchell's *Steam-shipping Journal* recently made the assertion that all the large steam-shipping companies in England would adopt propellers were it not for the prejudice among passengers in favor of side wheels. If this is true, there can be no doubt that the days of side-wheels for ocean steamers are numbered, for in this age mere blind prejudice cannot long maintain its ground against the real merits of any matter. At all events, there is no doubt that propellers are rapidly taking the place of both sails and side wheels, and unquestionably a very large portion of the transportation of the world is doomed to be performed by this class of vessels. Notwithstanding all the study which has been given to this subject by the most profound and most thoroughly cultivated intellects of the world, we doubt whether the next few years will not produce a number of valuable inventions in this department. The propeller is so important a thing that any improvement in it, however small, is of incalculable value.

The invention which we here illustrate is of a radical and sweeping character, with manifest advantages over the plan at present in use, which must cause its general introduction. The plan is to construct the ship with a slot through the run, a short distance from the stern. This part of the run is slightly modified in shape from the usual construction, so as to conform to the circular drum, B, which is made in the form of a frustum of a cone, and completely fills up the slot, so as to make a continuous smooth run when the projecting blades, A A A, are removed. To guard against any defect as to strength in this part of the ship, in addition to the strong method of framing (as shown in the cut), the invention provides other devices for strengthening with strong iron or other metal extending below the slot, and firmly fastened to the keel and both parts of the vessel. The diagonal braces, D D D D, are secured at their lower ends to this iron piece, while their upper ends are riveted to a strong iron strap, which completely encircles the ship. Other braces cross these, as clearly shown in the cut. This part is further strengthened by the shields, E, made very stiff, and securely bolted to the side, just high enough to be out of the way of the propeller.

Fig. 3



Two hollow iron beams large enough to serve for coal bunkers, extend along the inner sides of the ship, passing the point of the propeller, thus not only strengthening this point, but adding very much to the stiffness of the whole vessel. The blades are secured to the body of the propeller by dovetailed joints and screw bolts, and may be promptly removed through an opening in the deck, directly over the propeller, provided for that purpose, whenever it is desired to dispense with steam power and use sails alone. The body of the propeller is made hollow, and can be filled with a composition of cork dust and coal-tar, boiled down to the consistency of pitch, or with asphaltum, to prevent its being filled with water through any leak which might occur.

It is important that when this propeller is used in naval or other large vessels, the propeller box should not extend higher than the gun deck.

One great advantage claimed for this propeller is the large size which it can be conveniently made, giving great velocity to the blade with moderate rapidity of the revolutions, and it is claimed to obviate the following objections to ordinary propellers:—1. Difficulty of oiling the journals. 2. The drag of the rudder post and shaft through the water. 3. The tendency to hog the ship by the great weight of the propeller in the extreme stern. 4. Liability to injury from shot or other cause.

The patent for this invention was granted March 27, 1860; and further information in relation to it may be obtained by addressing the inventor, Henry W. Herbert, at Herbertsville, near Norfolk, Va.

THE WINDING OF TREES.

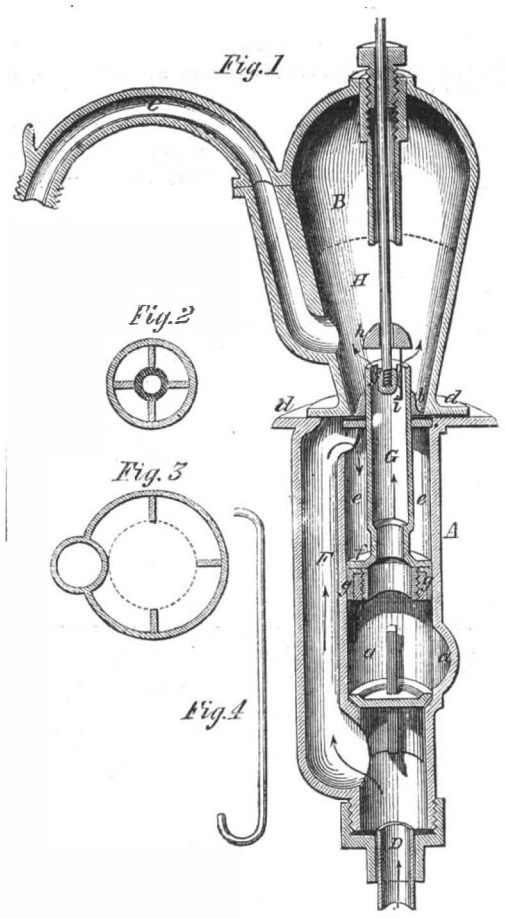
MESSRS. EDITORS:—I noticed the statement of your correspondent from Michigan, concerning winding trees; and as his observation was mostly on pine, I will give you mine on other timber. Oak seldom winds opposite the sun; and when we select rail timber, if it winds opposite the sun, we say it will make rails, as only the first cut will wind. Tamarack is generally very winding timber, and it is almost a natural curiosity to find one winding opposite the sun. I have never seen more than two or three, and I have cut hundreds of tamaracks. These are the facts; if any one can give the cause, I should be glad to hear it. A. C. L.

Burlington, Mich., May 26, 1860.

LLOYD'S PUMP.

The annexed cut represents a pump with some novel features which a very short description will rended plain to such of our readers as may be skilled in this class of inventions.

By the upward stroke of the hollow piston, G, the water is drawn in through the pipe, D, filling the lower part of the cylnder, A, including the enlargement, *a*.



The downward stroke of the piston closes the lower end of the cylinder, A, by pressing the valve, E, into its seat, and forces the water up through the hollow piston, G, and out at the discharge pipe, C, lifting the valve, *h*, from the top of the piston in its course; at the same time the water is drawn down from the side pipe, F, which causes its place to be supplied through the pipe, D. The mode in which the piston rod, H, is secured to the upper end of the piston, G, is clearly shown in Fig. 2. Fig. 3 is a cross section of the cylinder and side pipe, showing the position of the guides of the valve, E. In Fig. 1, *j*, is the guide of valve, *h*, while the letters, *a f* and *g*, indicate the places and arrangements for packing the piston, which will be readily understood.

For drawing the water from the pump, the rod shown in Fig. 4 is used for lifting the valve, E, from its seat; grooves being made in the piston just above the flange, *f*, through which the water may flow when this part of the piston is drawn up to the flange, *b*.

The patent for this invention was procured through the Scientific American Patent Agency, May 3, 1859, and further information in relation to it may be obtained by addressing the inventor A. W. Lloyd, at Otis, Mass.

Fig. 1

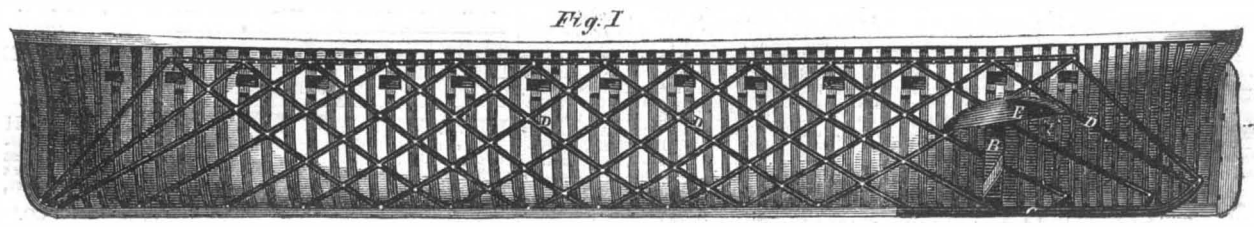
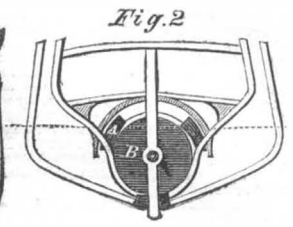


Fig. 2



HERBERT'S IMPROVEMENTS IN STEAMSHIPS.

A COTTON CLEANSER.—It is rumored that an ingenious person has introduced a very curious and valuable invention into New Orleans, in the shape of a cotton-cleanser. A quantity of the dirtiest cotton, scarcely saleable at all, is put into a kind of hopper, and in a moment you see it flying out at another aperture, quite clean and white. Three or four rollers, armed with wire about an inch and-a-half long, revolve in the same direction, and so that the teeth of one pass between the teeth of another. The cotton caught by the first roller would be carried up and round, but that the teeth of the next roller arrests it half-way up, take it from the teeth of the first and carry it under, to be taken in the same way by the next. The fiber is not at all torn, as is shown by passing a newspaper through the same process unharmed; but the dust is crushed to powder, the heavier portions falling to the bottom, and the lighter being blown out by a constant current of air, created for the purpose.

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